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ABSTRACT

The career academy approach is one of the oldest and most widely established high school reforms in the U.S., stretching back for more than 30 years. A large-scale, multi-site, random assignment research design was conducted to determine the impact of career academies on student outcomes. Some of the findings of the study include the following: (1) the career academies in the study increased both the level of interpersonal support students experienced and their participation in career awareness and work-based learning activities; (2) the career academies substantially improved high school outcomes among students at high risk of dropping out; (3) among students least likely to drop out, the career academies increased the likelihood of graduating on time; (4) in academies that greatly enhanced interpersonal support from teachers and peers, the dropout rates dropped dramatically; (5) the academies did not improve standardized mathematics and reading test scores; and (6) the impact of the academies and the types of students who participated in them varied greatly from site to site. The study concluded that career academies can be an effective means of reducing the high school dropout rate and enhancing students' engagement with school,

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especially if they increase personal support of students through involvement with teachers and peers. (Contains 33 references and two appendixes that provide supplementary information about the career academies research study and strategies for creating subgroups of students defined by at-risk characteristics.) (KC)

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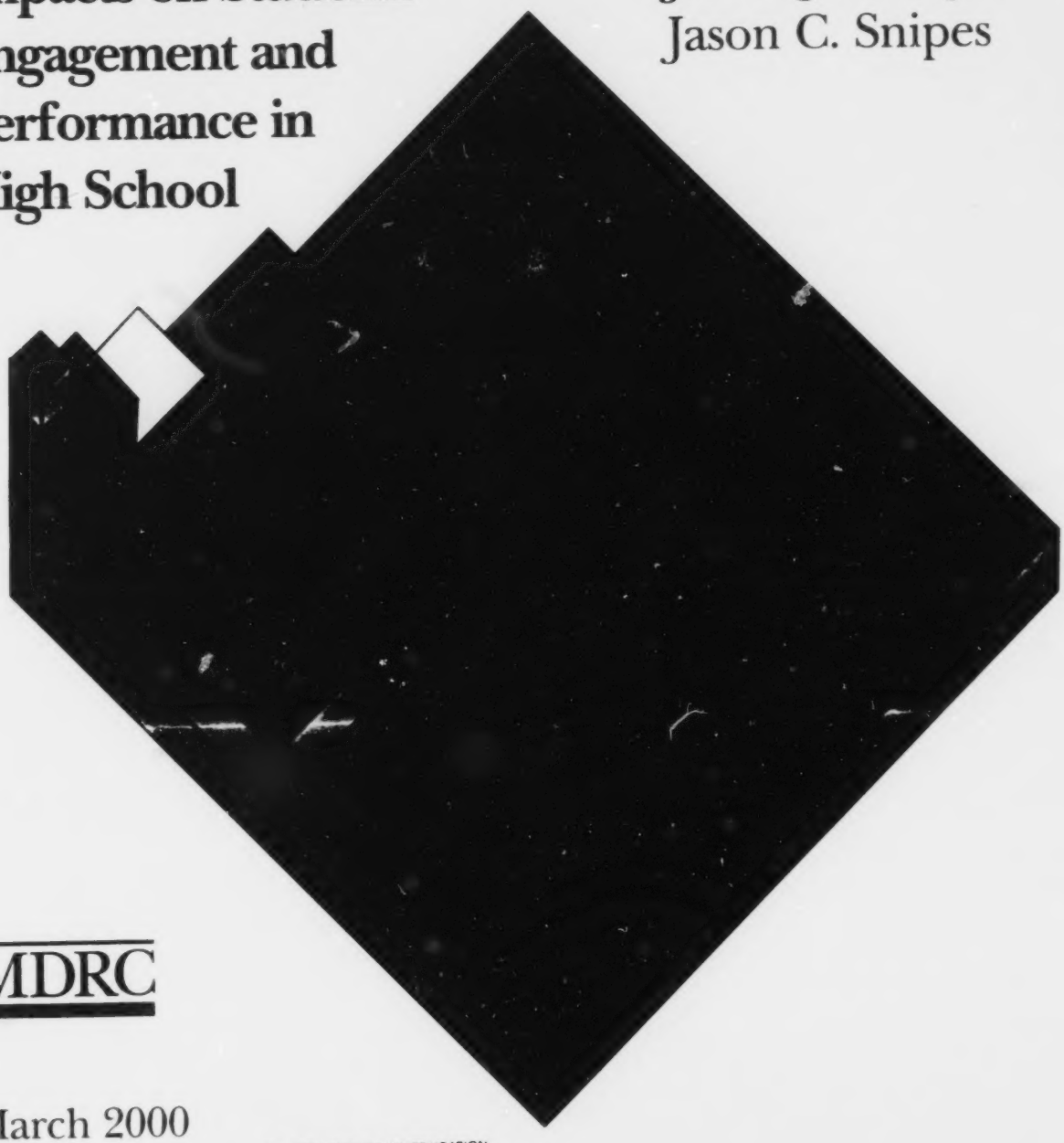
Career Academies

Impacts on Students' Engagement and Performance in High School

James J. Kemple
Jason C. Snipes



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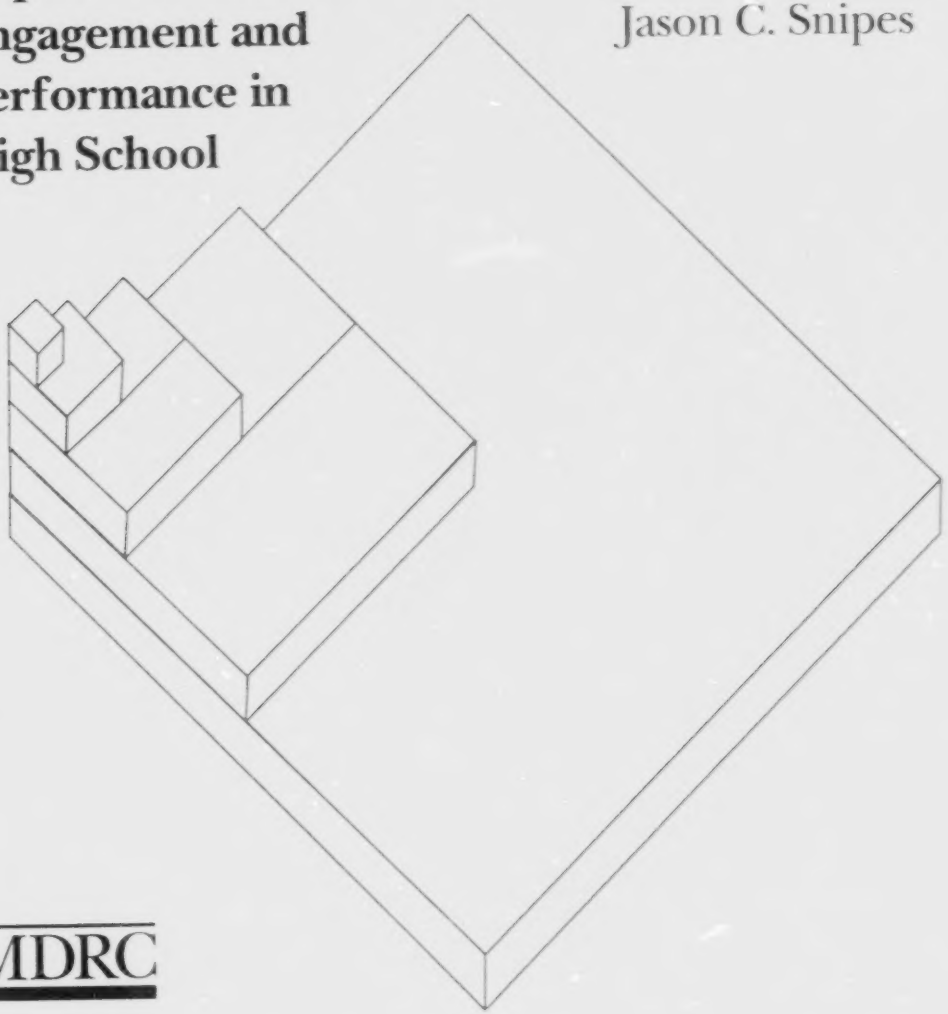

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Contents

Tables and Figures	**iv**
Preface	**vii**
Acknowledgments	**ix**
Executive Summary	**ES-1**
1 Introduction	**1**
I. The Origins of the Career Academy Approach and the Policy Context for This Report	2
II. Previous Research on Career Academies	6
III. A Conceptual Framework of the Career Academy Approach and Its Potential Impact on Student Outcomes	8
IV. Key Features of the Career Academies Evaluation	13
V. Overview of This Report	18
2 Career Academy Students and Their Patterns of Enrollment in the Academy Programs	**20**
I. Students in the Study Sample for This Report	20
II. Subgroups of Students Defined by Characteristics Associated with Dropping Out of High School	26
III. Career Academy Enrollment and Attrition Patterns	32
3 Career Academy Impacts on Student Engagement, Performance, and Achievement	**43**
I. Analysis Issues	44
II. Career Academy Impacts for Students in the High-Risk Subgroup	46
III. Career Academy Impacts for Students in the Low-Risk Subgroup	56
IV. Career Academy Impacts for Students in the Medium-Risk Subgroup	65
V. Career Academy Impacts Averaged Across the Student Subgroups	71
VI. Conclusions	72
4 Factors Associated with Student Outcomes and the Pattern of Career Academy Impacts	**74**
I. Potential Pathways to Positive Student Outcomes	74
II. Sources of Variation Among the Sites That May Be Associated with Differences in Impacts	76
5 The Relationship Between Career Academy Implementation and Impacts	**82**
I. Contrasting Impacts for Students in the Medium-Risk Subgroup	83
II. Contrasting Impacts for Students in the High-Risk Subgroup	89
III. Contrasting Impacts for Students in the Low-Risk Subgroup	92
IV. Summary	94
Appendix A Supplementary Information About the Career Academies Evaluation Research Sample and Data Sources	97
Appendix B Strategies for Creating Subgroups of Students Defined by Characteristics Associated with Risk of Dropping Out	115
References	134
Recent Publications on MDRC Projects	136

Tables and Figures

Table

ES-1	Background Characteristics of Students, by Subgroups Defined by Risk of Dropping Out of School	ES-10
2.1	Background Characteristics of Study Sample, by Research Status	21
2.2	Background Characteristics of Study Sample, by Subgroups Defined by Risk of Dropping Out of School	29
2.3	Career Academy Enrollment and Attrition Rates for Selected Subgroups of the Academy Group	38
3.1	Impacts on School Enrollment and Attendance for Students in the High-Risk Subgroup	48
3.2	Impacts on Credits Earned and Course-Taking for Students in the High-Risk Subgroup	49
3.3	Impacts on Achievement Test Scores for Students in the High-Risk Subgroup	52
3.4	Impacts on Experiences During the 12th Grade Year for Students in the High-Risk Subgroup	54
3.5	Impacts on Planning and Preparation for College and Work for Students in the High-Risk Subgroup	57
3.6	Impacts on School Enrollment and Attendance for Students in the Low-Risk Subgroup	59
3.7	Impacts on Credits Earned and Course-Taking for Students in the Low-Risk Subgroup	61
3.8	Impacts on Achievement Test Scores for Students in the Low-Risk Subgroup	62
3.9	Impacts on Experiences During the 12th Grade Year for Students in the Low-Risk Subgroup	63
3.10	Impacts on Planning and Preparation for College and Work for Students in the Low-Risk Subgroup	64
3.11	Impacts on School Enrollment and Attendance for Students in the Medium-Risk Subgroup	66
3.12	Impacts on Credits Earned and Course-Taking for Students in the Medium-Risk Subgroup	67
3.13	Impacts on Achievement Test Scores for Students in the Medium-Risk Subgroup	68
3.14	Impacts on Experiences During the 12th Grade Year for Students in the Medium-Risk Subgroup	69
3.15	Impacts on Planning and Preparation for College and Work for Students in the Medium-Risk Subgroup	70
3.16	Impacts on Selected High School Outcomes for Students in the Study Sample	71
4.1	Students' Perceptions of Interpersonal and Instructional Supports and Participation in Work-Related Activities, by High-Contrast and Low-Contrast Academies	78
5.1	Impacts on Enrollment, Attendance, and Course-Taking for Students in the Medium-Risk Subgroup, by High-Contrast and Low-Contrast Academies	84
5.2	Impacts on Youth Development Experiences and Preparation for the Future for Students in the Medium-Risk Subgroup, by High-Contrast and Low-Contrast Academies	87

5.3	Impacts on Enrollment, Attendance, and Course-Taking for Students in the High-Risk Subgroup, by High-Contrast and Low-Contrast Academies	90
5.4	Impacts on Youth Development Experiences and Preparation for the Future for Students in the High-Risk Subgroup, by High-Contrast and Low-Contrast Academies	91
5.5	Impacts on Enrollment, Attendance, and Course-Taking for Students in the Low-Risk Subgroup, by High-Contrast and Low-Contrast Academies	93
5.6	Impacts on Youth Development Experiences and Preparation for the Future for Students in the Low-Risk Subgroup, by High-Contrast and Low-Contrast Academies	95
A.1	Data Availability for the Full Study Sample and the Risk Subgroups	99
A.2	Regression Coefficients for Probability of Being Assigned to the Academy Group for Full Study Sample and by Risk Subgroups	103
A.3	Regression Coefficients for Probability of Being Assigned to the Academy Group, Student School Records Database, for Full Study Sample and by Risk Subgroups	106
A.4	Regression Coefficients for Probability of Being Assigned to the Academy Group, 12th Grade Survey Database, for Full Study Sample and by Risk Subgroups	109
A.5	Regression Coefficients for Probability of Being Assigned to the Academy Group, 12th Grade Achievement Test Sample, for Full Sample and by Risk Subgroups	112
B.1	Relationship Between Baseline Characteristics and the Probability of Dropping Out of High School Among Non-Academy Students	119
B.2	Selected Outcomes Among Non-Academy Students, by Risk Subgroups Defined Using Risk-Factor Accumulation and Regression-Based Index	124
B.3	Outcome Levels for Bootstrap Control Samples and Program Group, by Risk Subgroups	130

Figure

ES-1	Career Academy Impacts on High School Outcomes in the High-Risk Subgroup	ES-12
ES-2	Career Academy Impacts on High School Outcomes in the Low-Risk Subgroup	ES-13
ES-3	Career Academy Impacts on High School Outcomes in the Medium-Risk Subgroup	ES-15
ES-4	Career Academy Impacts on High School Outcomes for the Full Study Sample	ES-16
ES-5	Simplified Conceptual Model of the Career Academy Approach	ES-18
ES-6	Career Academy Impacts on High School Outcomes for Students in the Medium-Risk Subgroup, by High-Contrast and Low-Contrast Academies	ES-20
1.1	Simplified Conceptual Model of the Career Academy Approach	9
1.2	Random Assignment Design	14
2.1	12th Grade Outcomes Among Non-Academy Students, by Risk Subgroup	33
2.2	Career Academy Enrollment and Attrition Patterns Among Students Selected to Enroll	35
B.1	Impact of Career Academies on Dropout Rate, by Deciles of the Regression-Based Risk Index	122

Preface

Career Academies have existed for more than 30 years, and they can now be found in an estimated 1,500 high schools nationwide. The durability and broad appeal of the Career Academy approach can be attributed, in part, to the fact that its core features offer direct responses to a number of problems that have been identified in large comprehensive high schools. Career Academies consist of small learning communities that aim to create a more personalized and supportive learning environment for students and teachers. They combine academic and career-related courses in an effort to enhance both the rigor and the relevance of the high school curriculum. Career Academies form partnerships with local employers to expand students' exposure to career options and skills requirements and to provide them with work-based learning experiences. The primary goals of the Career Academy approach are to enhance students' engagement and performance in high school and provide them with the credentials and skills needed to make successful transitions to post-secondary education and, eventually, a career.

This report from MDRC's ongoing Career Academies Evaluation is being released at a time when education policymakers and practitioners are pursuing a number of far-reaching strategies for improving American high schools. Many of these strategies include principles embedded in the Career Academy approach, while others include the Career Academy model as an explicit component. In short, Career Academies stand at the intersection of several major education reforms aimed at transforming high schools into nurturing, productive places where students learn and grow and are prepared for careers in an economy that demands high skills and adaptability.

In partnership with the funding organizations listed at the front of this report and with staff from the participating sites, MDRC began an in-depth evaluation of the Career Academy approach in 1993. The primary purpose is to provide policymakers and educators with reliable evidence about the extent to which the Academies deliver on their ambitious goals, outlined above. In particular, the evaluation provides a rigorous assessment of Career Academies' effects on a range of education, developmental, and work-related outcomes for high school students. The study also offers lessons about how Career Academies operate and are sustained and about the pathways through which they affect students' engagement and performance during high school and beyond.

This report marks an important milestone in the Career Academies Evaluation. Previous reports and papers from the study described some distinctive features of the Career Academies, relative to their regular school environments, and examined some differences in the school- and work-based experiences of Academy and non-Academy students in the study sample. These reports concluded that the distinctive features of the participating Career Academies had indeed enhanced students' experiences in school and the workplace. The current report provides evidence about the extent to which these enhancements translated into higher levels of school engagement and performance and whether Academy students are better prepared than their non-Academy peers to make the transition from high school to further education and the labor market.

The findings suggest that a growing number of high schools may be on the right path toward keeping students engaged in school and preparing them for further education and a career.

Career Academies reduced dropout rates and improved school engagement among students least likely to do well in a regular school environment. While the Academies produced more modest effects for other students, they created a more supportive school environment for all students and provided them with more opportunities to explore careers and engage in work-based learning opportunities. It is not yet clear how the Academies affect students as they navigate the transition between high school and college and the labor market. The evaluation will continue to follow students in the study sample to assess the Academies' longer-term post-high school effects.

The report draws on a particularly rigorous research design and an unusually rich database. This evaluation has demonstrated the feasibility and benefits of using a random assignment research design to determine the impact of Career Academies on student outcomes. A rarity in education research, this design provides an especially reliable way of comparing the performance of students who had access to an Academy with that of a truly comparable group of students who did not have access to the programs. The database consists of survey information provided by Academy and non-Academy students in the study sample, performance indicators obtained from school records and transcripts, and standardized test scores from a test MDRC administered to a sample of the students. The report also draws on qualitative information collected during the many field visits to each of the participating sites over the past seven years and through ongoing communication with the staff in the sites. Students in the study sample were identified in the 8th or 9th grade, and this report follows them through the end of their scheduled 12th-grade year until just before they would have graduated from high school.

It is our hope that the Career Academies Evaluation will continue to offer policymakers and educators useful lessons about what works for high school students and about the value of subjecting promising school reform approaches to rigorous tests of their effectiveness.

Judith M. Gueron
President

Acknowledgments

This report marks the end of the first phase of the Career Academies Evaluation. Over the last seven years, the staff at MDRC have had the opportunity to work with and learn from an extraordinary group of sites, funders, and advisers. The products of this collaboration include the implementation of an exceptionally strong research design and the compilation of a deep and rich database. Previous reports from the study have acknowledged the contributions of the many individuals and organizations who helped lay the foundation for the evaluation and who played key roles in the preparation of those documents. This report is built upon that foundation and owes a special debt to these individuals and organizations.

First, the authors are indebted to the teachers, administrators, students, and employer partners at all of the Career Academy programs. Their experiences and insights taught us a great deal about life in Career Academies and in high schools. We also greatly appreciate the help of staff from each of the participating school districts who assisted MDRC in collecting the data for this report. Second, several key advisers to the evaluation offered useful feedback. In particular, David Stern of the University of California at Berkeley has been invaluable in providing guidance for further analyses and helping us gain better insights into the results. The theoretical framework for describing the likely effects of the Career Academy approach benefited from perspectives and analyses provided by James P. Connell and Lisa Bridges of the Institute for Research and Reform for Education, and from analyses conducted by Lauren Brown, a consultant to the project.

The following people provided thoughtful feedback on earlier drafts of the report or offered suggestions at briefings we held to discuss the findings: Kent McGuire and Nevzer Stacey of the U.S. Department of Education's Office of Educational Research and Improvement, David Goodwin and Marcia Silverberg of the U.S. Department of Education's Planning and Evaluation Service; Patricia McNeil of the U.S. Department of Education's Office of Vocational and Adult Education; Stephanie Powers, Sharon Belli, and Chris Kulick of the National School-to-Work Office; Lorenzo Harrison, Gerri Fiala, Irene Lynn, Gerald Gunderson, Harry Holzer, David Lah, Eileen Pederson, Daniel Ryan, and Marlin Ferral of the U.S. Department of Labor.

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From the beginning of the Career Academies Evaluation, Robert Ivry, MDRC's Senior Vice President for Development and External Affairs, has played a pivotal role in building the partnerships with sites, funders, and advisers that form the foundation for the study. This report benefited greatly from his insights and guidance on sharpening the presentation of the findings and policy implications. Several MDRC staff members played key roles in acquiring and analyzing data for the evaluation. Anita Kraus, with help from Joel Gordon, prepared the final school records data files for analysis. Special thanks to Richard Hendra for processing the thousands of school transcript records and creating a rich set of outcome measures from them. Susan Poglinco conducted field research activities in several of the sites and provided useful information about the context within which the programs operated.

Katherine Jamieson provided research assistance, prepared the tables and figures, and coordinated the production of this report. Howard Bloom, Hans Bos, Charles Michalopoulos, and Winston Lin provided valuable perspectives and guidance on the strategy used to identify the subgroups discussed in the report. Fred Doolittle, Robert Granger, Robert Ivry, Susan Kagehiro, Marilyn Price, and JoAnn Rock reviewed drafts of the report. Robert Weber edited the report, and Stephanie Cowell prepared the manuscript for publication.

The Authors

Executive Summary

The Career Academy approach is one of the oldest and most widely established high school reforms in the United States. Career Academies have existed for more than 30 years and have been implemented in more than 1,500 high schools across the country. The durability and broad appeal of the Academy approach can be attributed, in part, to the fact that its core features offer direct responses to a number of problems that have been identified in large comprehensive high schools. Career Academies attempt to create more supportive and personalized learning environments through a school-within-a-school structure. Their curricula combine academic and occupation-related course requirements that aim both to promote applied learning and to satisfy college entrance requirements. Academies establish partnerships with local employers to build sequences of career awareness and work-based learning opportunities for their students.

While the basic organizational features of the approach have remained the same since Career Academies' inception, the goals and target population have changed. The original Academies were designed primarily to prevent dropping out of high school and to increase preparation for work among students who began high school at high risk of school failure. There is now widespread agreement that Career Academies should seek to prepare students for both work *and* college, and that they should include a broad cross-section of students, including those who are highly engaged in school.

There has been a great deal of research on the Academy approach. Nevertheless, previous studies have been unable to determine reliably whether differences between Academy students' high school experiences and outcomes and those of other students result from the Academy itself or from the program's student targeting or its selection practices. Further, little is known about the relative effectiveness of Academies for different groups within the broad cross-section of students they now serve. There have also been few opportunities to explore the extent to which different contexts and implementation strategies may influence the effectiveness of the Academy approach.

This evaluation has demonstrated the feasibility and benefits of using a large-scale, multisite random assignment research design to determine the impact of Career Academies on student outcomes. A rarity in education research, this design provides a uniquely rigorous way of comparing the performance of students who had access to an Academy with the performance of a truly comparable group of students who did not have access to the programs. In order to address a number of key policy issues for Academies and related high school reforms, this report focuses on three questions:

- To what extent does the Career Academy approach alter the high school environment in ways that better support students academically and developmentally?
- To what extent does the Career Academy approach change educational, employment, and youth development outcomes for students at greater or lesser risk of school failure?

- How do the manner and context in which Career Academy programs are implemented influence their effects on student outcomes?

This report marks a milestone in the Manpower Demonstration Research Corporation's (MDRC) 10-year Career Academies Evaluation, which is being supported by the U.S. Departments of Education and Labor and by 17 private foundations and organizations. The report focuses on over 1,700 students who had applied for one of nine Career Academies participating in the evaluation.[1] The participating Academies were able to implement and sustain the basic features of the approach and have adapted to a wide range of local needs and circumstances. They include a range of technical, service-oriented, and business-related career themes and are located in small cities and large urban school districts. Students in the study sample were identified when they were in 8th or 9th grade, and this report follows them through the end of their scheduled 12th-grade year.

Findings in Brief and Policy Implications

Throughout this report, the term *impact* refers to differences between outcomes for students who were randomly selected to enroll in an Academy and those of students who also applied but were not selected to enroll. Academy applicants were assigned to these groups at random, so there were no systematic differences in the characteristics or school experiences of the applicants initially. Thus, subsequent differences in outcomes for the two groups reflect increases or decreases caused by the Career Academies. Following is a summary of the key findings from the report.

- The Career Academies in this study increased both the level of interpersonal support students experienced during high school and their participation in career awareness and work-based learning activities.

- The Career Academies substantially improved high school outcomes among students at high risk of dropping out. For this group, the Academies reduced dropout rates, improved attendance, increased academic course-taking, and increased the likelihood of earning enough credits to graduate on time.

- Among students least likely to drop out of high school, the Career Academies increased the likelihood of graduating on time. The Academies also increased vocational course-taking for these students without reducing their likelihood of completing a basic core academic curriculum.

- In sites where the Academies produced particularly dramatic enhancements in the interpersonal support that students received from teachers and peers, the Career Academies reduced dropout rates and improved school engagement for both high-risk and medium-risk subgroups (about 75 percent of the students

[1]Ten sites were initially selected for the evaluation. One of the initial Career Academies was disbanded after two years in the study and was unable to provide sufficient follow-up data to be included in the impact analysis for this report.

served). Academies that did not enhance these supports actually increased dropout rates and reduced school engagement for some students.

- The Career Academies did not improve standardized math and reading achievement test scores.

- When the findings are averaged across the diverse groups of students in the full study sample, it appears that the Career Academies produced only slight reductions in dropout rates and modest increases in other measures of school engagement. These aggregated findings, however, mask the high degree of variation in effectiveness among different groups of students and across the different program contexts.

The findings that have emerged from the Career Academies Evaluation to date suggest the following implications for policies aimed at improving high schools and helping students prepare for the transition from high school to further education and work.

- Career Academies provide a well-defined approach to creating more supportive high school environments and increasing students' exposure to career awareness and work-based learning activities.

- Among students who are most at risk of dropping out of high school, Career Academies are an effective means of preventing dropout, increasing school engagement, and helping students acquire the credentials they need to graduate and prepare for post-secondary education.

- Career Academies should continue to serve a heterogeneous population of students. The pervasive positive impacts for students at high risk of dropping out may derive, in part, from exposure to a highly engaged peer group who, on balance, also benefit from exposure to several key dimensions of the Academy experience.

- If Career Academies do not complement their career-related curriculum and work-based learning activities with strong interpersonal and academic supports, they risk reducing school engagement for some students. A highly structured school-within-a-school organization can create a necessary set of conditions for providing these supports.

- Career Academies should build on the effective organizational enhancements they bring to high school reform efforts if they are to improve academic achievement as measured by most standardized tests currently in use. Promising approaches may involve aligning Career Academy curricula with high standards and providing teachers with the incentives and capacity to deliver on such standards.

The above results capture the effects that the Career Academies have had on students through the end of their scheduled 12th-grade year. The evaluation does not yet include information about the rates at which these students actually graduated from high school and whether the dropouts eventually returned to high school or pursued an alternative credential. The next phase

of this evaluation will include this information and will follow the students in the study sample for four additional years as they make the transition from high school to post-secondary education and employment opportunities.

The remainder of this Executive Summary describes the Career Academy approach in greater detail, including its history, and discusses the current policy context and previous research in the Career Academies Evaluation. It then describes the results of the evaluation and their implications for policy and practice.

The Career Academy Approach

The Career Academy approach is distinguished by three core features that offer direct responses to several problems that have been identified in high schools, particularly those serving low-income communities and students at risk of school failure. First, a Career Academy is organized as a *school-within-a-school* in which students stay with a group of teachers over three or four years in high school. Such arrangements are often referred to as "small learning communities." The aim is to create a more personalized and supportive learning environment for students and teachers. Second, a Career Academy offers students a combination of *academic and vocational curricula* and uses a career theme to integrate the two. Third, a Career Academy establishes *partnerships with local employers* in an effort to build connections between school and work and to provide students with a range of career development and work-based learning opportunities. This definition of an Academy is now commonly accepted and was reviewed by a broad range of researchers, policymakers, and practitioners who have worked closely with Career Academies.

The initial Career Academies of the 1970s and 1980s were primarily vocational education programs targeted at students who appeared to be at high risk of dropping out of high school. The central goals of these early programs were to keep students engaged in school, provide them with work-related learning experiences both in the classroom and on the job, and establish clearer pathways between high school and post-secondary employment.

Since the late 1980s, there has been a shift in the primary goals and target population of most Career Academies. In particular, there is now wide agreement that the Career Academy approach should be explicitly distinct from traditional vocational education by seeking to prepare students for both work *and* college. Vocational education, as defined in federal law and through its historical legacy, has been directed at preparing young people for occupations that do not traditionally require advanced degrees. In line with what has been called "the new vocational education," Career Academies now seek to include a broad range of students and to combine a rigorous academic curriculum with exposure to extensive information about an industry both in the workplace and in the classroom. The career theme is used to integrate curricula and provide exposure to a broad array of careers in a given field and does not typically focus on preparing students for jobs in those areas.

The 1990s have seen extraordinary growth in the number of Career Academies around the country. There are estimated to be more than 1,500 Career Academies nationwide, representing nearly a 15-fold increase in approximately 10 years; many more Academies are in the planning stages. Much of this growth can be traced to the increasing number of national, state, and district

Academy support networks. Although most Career Academies share the approach's basic elements, the Academy model has been adapted to a wide range of local needs and circumstances, resulting in a variety of versions that emphasize different features over others.

The expansion of Career Academy target populations and goals and the rapid growth in the number of Academies have raised several questions about how the Academy approach may be affecting students' performance in high school. How well does it meet the needs of a much broader range of students than it was initially designed to serve? Is the Academy approach more effective under some conditions than under others? Which features of the Academy model make the most difference for students? MDRC's Career Academies Evaluation is intended to shed light on these and other questions.

The Current Policy Context

This report is being released at a time when education policymakers and practitioners are pursuing a number of far-reaching strategies for improving American high schools. Many of these strategies include principles embedded in the Career Academy approach, while others include the Career Academy model as an explicit component. Two key policy initiatives are particularly relevant.

First, states, school districts, and employers are now looking for strategies and approaches that can build on the foundation established by the School-to-Work Opportunities Act (STWOA) of 1994. STWOA was aimed at enhancing the relevance and rigor of school- and work-based learning and at creating clearer pathways between high school and post-secondary education and careers. This was to be done primarily through partnerships between schools and local employers. STWOA specifically identifies Career Academies as a "preferred approach" to creating such partnerships and implementing the principles embedded in the legislation. STWOA is scheduled to sunset in 2001 — adding urgency to these efforts and heightening interest in concrete evidence of the potential payoff of Career Academies.

Second, the U.S. Department of Education has committed itself to several initiatives aimed specifically at addressing problems that are unique to high schools. Many of these initiatives are being supported under the Comprehensive School Reform Demonstration developed within the Office of Educational Research and Improvement (OERI) and the New American High Schools established by the Office of Vocational and Adult Education (OVAE). Although most of the strategies that are being developed involve comprehensive reforms of entire high schools, many include key elements of the Academy approach, including the creation of a small school-within-a-school, integration of academic and vocational curricula, and the establishment of partnerships with employers and other organizations in the community.

The findings presented in this report will shed light on the extent to which the Career Academy model, and some of the high school reform approaches embedded in the model, can achieve the goals sought by their proponents.

The Career Academies Evaluation

In 1993, MDRC began an evaluation of the Career Academy approach as it had been defined in previous research and implemented in a broad range of settings across the country. The evaluation's primary goal is to provide policymakers and educators with reliable evidence about the impact that Career Academies have on students' success in high school and their transition to further education and the labor market. The evaluation will also offer lessons about how Career Academies operate and are sustained and about the pathways through which Academies affect student engagement and performance in school.

The current report is based on information collected over a six-year period and focuses on nine high schools and their Career Academies.[2] Each of the Academies had established the basic Career Academy components described earlier: a school-within-a-school organization, an integrated academic/vocational curriculum, and employer partnerships. Moreover, this combination of features was not available elsewhere in the participating high schools.[3] These Academies were selected to include school districts and high schools reflecting the typical conditions (large urban centers and small cities) under which Career Academies have been implemented across the country. MDRC was specifically interested in Academies serving a broad range of students, including those who were perceived to be at risk of not succeeding in the regular high school environment. Most of the school districts in the evaluation are large and enroll substantially higher percentages of African-American and Hispanic students than school districts nationally. On average, these school districts have higher dropout rates, higher unemployment rates, and higher percentages of low-income families.

The Career Academies Evaluation is a rarity in the field of education research in that it has demonstrated the feasibility and benefits of implementing a large-scale, multi-site random assignment research design within an ongoing high school program. This was made possible because each of the Career Academies in the study received applications from approximately twice as many students as it was able to serve. This reports focuses on a sample of 1,764 students (referred to in this report as the *study sample*) who applied for one of the Career Academies selected for the study. Of these, 959 students were randomly assigned to the program group (referred to in this report as the *Academy group*) and were accepted for admission to the Academies. The remaining 805 students were randomly assigned to a control group (referred to in this report as the *non-Academy group*) and were not invited to participate in the Academies, although they could choose other options in the high school or school district.

The random assignment process ensured that there were no systematic differences between the two groups of students in terms of their observable and unobservable background characteristics, prior school experiences, and initial motivation and attitudes toward school. Any systematic

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[2]For a more detailed description of the criteria and process used to select sites for this study, see James J. Kemple and JoAnn Leah Rock, *Career Academies: Early Implementation Lessons from a 10-Site Evaluation* (New York: MDRC, 1996).

[3]Although some participating high schools do operate other programs that they classify as Career Academies, information collected for this study indicated that most such programs do not include all the basic components of the Academy approach described earlier. As a result, the participating Career Academy programs represent a clear contrast with the other programs in the high schools.

differences that subsequently emerged between the groups can be attributed with confidence to differences in their access and exposure to the Career Academies.

MDRC obtained data for this report from four sources:

- **school transcript records,** including information about students' daily attendance rates, credits earned toward graduation, and course-taking patterns;
- **student surveys** that asked a wide range of questions about school experiences, employment and work-related experiences, extracurricular activities, preparation for college and post-secondary jobs, and plans for the future;
- **standardized math computation and reading comprehension tests** administered to 490 students from the study's sample (from both the Academy and the non-Academy groups) at the end of their 12th-grade year;[4] and
- **qualitative field research** conducted throughout the evaluation to document Academies' characteristics, local contexts, staff, students, and employer partners.

Students in the study sample were identified at the end of 8th or 9th grade. This report follows them for three or four years through the end of their scheduled 12th-grade year, until just before they would have graduated from high school. The primary focus of the report is on outcomes measured at the end of students' scheduled 12th-grade year. Unless otherwise noted, the impact findings discussed in the report are statistically significant, indicating that one may have a high degree of confidence that measured differences in outcomes between the Academy and the non-Academy groups were not a result of chance.

Previously Reported Findings on How Career Academies Changed Students' High School Experiences

The previous reports from this evaluation examined the extent to which Career Academies changed the high school environment as indicated by differences between Academy and non-Academy students' experiences during high school.[5] Following is a brief overview of key findings from these reports.

- **The Career Academies enhanced the degree of interpersonal support students received from teachers and peers.**

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[4]The test instrument comprised the reading comprehension and math test batteries from the National Educational Longitudinal Survey of 1988 (NELS: 88) Follow-up Study. A total of 490 students from the study sample completed the test, including both high school dropouts and students who remained enrolled in school.

[5]For a more detailed discussion of these findings, see James J. Kemple, *Career Academies: Communities of Support for Students and Teachers: Emerging Findings from a 10-Site Evaluation* (New York: MDRC, 1997); James J. Kemple, "Selected Dimensions of Applied Learning in Career Academy Classrooms," unpublished MDRC paper, 1997; and James J. Kemple, Susan M. Poglinco, and Jason C. Snipes, *Career Academies: Building Career Awareness and Work-Based Learning Activities Through Employer Partnerships* (New York: MDRC, 1999).

During their early years in high school, Academy students received more support from their teachers and peers than did their counterparts in non-Academy high school environments. For example, compared with their non-Academy peers, Academy students reported that their teachers had higher expectations of them and that teachers provided them with more individualized attention. Moreover, compared with their non-Academy counterparts, Academy students were more likely to report that their classmates were highly engaged in school and that they had many opportunities to collaborate with their peers on school and work-related projects.

- **Career Academies increased students' participation in career awareness and work-based learning experiences during high school.**

Academies also increased students' exposure to work-related learning experiences in school and in the workplace. Academy students were more likely than their non-Academy peers to be exposed to career-related themes or activities in the classroom. They were also more likely to participate in career-related activities such as job-shadowing or field trips. Finally, Academy students were more likely than non-Academy students to participate in a planned program of work experience and to have high-quality work-based learning experiences during high school.

- **The Career Academies in this evaluation demonstrated their capacity to attract large numbers of applicants and to include students with a wide range of demographic and education characteristics.**

The growth of the Career Academy movement has been accompanied by questions about whether the programs can and should serve a broad range of students and about which students benefit most from them. Reflecting the shift in goals and target populations of Career Academies nationwide, the programs in this evaluation attracted a mix of students including those at risk of dropping out of high school or failing academically as well as students who had done well in school. Most of the students in the study sample are from minority backgrounds — 56 percent are Hispanic, and 30 percent are African-American — reflecting the racial and ethnic make-up of their communities. Also, more than one-third of the students came from single-parent households, and about one-quarter indicated that their families received public assistance. At the same time, just under half the students reported that both their parents were employed, and about one-third reported that at least one parent had attended college.

- **Approximately 88 percent of the students selected for admission to a Career Academy actually enrolled in the programs, and 58 percent of those selected remained in an Academy throughout high school.**

Of the students who were initially selected for admission, about 12 percent chose not to enroll, and another 30 percent enrolled in the programs and then left before the end of their 12th-grade year. It is unclear how much of this attrition could possibly be controlled or avoided by the Career Academies. Student mobility and early dropout are common in most urban school districts, and they were reasons for attrition from the Academies in this evaluation. Just under one-quarter of the students who never enrolled in an Academy or who enrolled and then left reported that they did so because their families moved and they had to transfer to other schools. Another 20 percent reported that they were asked to leave the programs or dropped out of high school altogether. The remaining students (approximately 55 percent of those who were not enrolled in an Academy in the 12th grade) chose not to enroll or chose to leave the programs. The most common

reasons students gave for not enrolling or for not remaining enrolled in an Academy were that they wanted to enroll in another program, they lost interest in the occupational area, or they did not think the Academy would help them get into a good college.

The Impact of Career Academies on Student Outcomes

The central theme that has emerged from the Career Academies Evaluation thus far is that the Academies affected the outcomes for students who were likely to drop out of high school much more than they affected the outcomes for other students. When the results are averaged across the diverse groups of students they serve, it appears that the Academies produced only slight reductions in dropout rates, modest improvements in students' progress toward high school graduation, and increases in career-related course-taking and involvement in positive youth development activities. These aggregate results mask a high degree of variation in the Career Academies' potential to make a difference and in the actual differences they made for some students.

To assess this variation in impacts, the study sample was divided into three subgroups based on selected background characteristics and prior school experiences. These characteristics were chosen as indicators of students' engagement in school at the time they applied for an Academy and as factors associated with the likelihood of their eventually dropping out of school. (See Table ES-1 for a list of the background characteristics used to define these subgroups.) Just over one-quarter of the students were classified as being in the *high-risk subgroup* and reflected the combination of characteristics associated with the highest probability of dropping out among those in the non-Academy group. Approximately one-quarter of the students in the sample were classified as being in the *low-risk subgroup* and reflected the combination of characteristics associated with the lowest probability of dropping out among those in the non-Academy group. The remaining students (approximately half the sample) were defined as being in the *medium-risk subgroup*.

Because each of the characteristics used to define the subgroups was measured before students were randomly assigned to the two main study groups, there are no systematic differences in observed background characteristics between Academy and non-Academy groups within each of the three risk subgroups.[6] The following sections summarize the impact findings for these subgroups.

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[6]The definition of these subgroups involved analyses using background characteristics to predict dropping out among students in the non-Academy group. This generated an index of average characteristics of likely dropouts who did not have access to an Academy. The index was then calculated for the Academy group using the same characteristics. Because the predicted relationship between background characteristics and dropout rates was based on the non-Academy group, however, it is likely to yield somewhat more accurate predictions of likely dropouts for that group than for the Academy group. This means that the dropout rate for the students in the high-risk non-Academy group may be artificially high. Extensive analyses were conducted to identify the potential magnitude of this distortion. These analyses indicate that whatever distortion exists is minimal and could not have changed the pattern of impacts. This issue is discussed in greater detail in Appendix B of the report.

Table ES-1

Career Academies Evaluation

Background Characteristics of Students, by Subgroups Defined by Risk of Dropping Out of School

Characteristic	High-Risk Subgroup (%)	Medium-Risk Subgroup (%)	Low-Risk Subgroup (%)
Characteristics associated with dropping out of school			
Attendance rate, year prior to random assignment			
96-100%	24.4	52.5	91.0
91-95%	23.6	32.3	7.9
86-90%	18.7	11.7	1.0
85% or lower	33.3	3.6	0.2
Credits earned in 9th grade[a]			
5 or more credits	47.2	93.8	100.0
3-4 credits	35.1	6.3	0.0
2 or fewer credits	17.7	0.0	0.0
Grade point average in year of random assignment[b]			
3.1 or higher	12.5	37.2	58.6
2.1-3.0	25.5	44.0	39.3
2.0 or lower	62.0	18.7	2.1
Student is overage for grade level[c]	43.0	18.2	2.4
School mobility[d]			
0 or 1 different school	50.0	71.9	99.0
2 or more different schools	50.0	28.1	1.0
Student has sibling who dropped out of high school	42.7	17.5	0.5
Sample size (N=1,764)	474	869	421

SOURCES: MDRC calculations from the Career Academies Evaluation Student Baseline Questionnaire and Student School Records Databases.

NOTES: All characteristics were measured at the time students applied to the Career Academy program and prior to being randomly selected to the Academy and non-Academy groups.

Invalid or missing values are not included in individual variable distribution. Rounding may cause slight discrepancies in calculating of sums and differences.

Statistical significance tests are not included.

[a]This was applicable only to students who applied to the Career Academy at the end of their 9th-grade year.

[b]Grade point averages were converted to a standard 4.0 scale from 100-point or 5-point scales for some sites.

[c]A student is defined as overage for grade at the time of random assignment if she or he turned 15 before the start of the 9th grade, or 16 before the start of the 10th grade. This indicates that the student was likely to have been held back in a previous grade.

[d]School mobility is defined as the number of schools attended since the 1st grade beyond the number expected to result from promotions in grade level or graduations.

Career Academy Impacts for Students in the High-Risk Subgroup

As shown in Table ES-1, students in the high-risk subgroup entered the study with background characteristics and prior school experiences indicating that they were disengaged from school. More than half had failed courses during the 9th grade, and about one-third could be classified as chronic absentees (having attendance rates lower than 85 percent). Most of these students had low grade point averages (2.0 or lower), and over 40 percent had been held back in a previous grade (as indicated by being overage for their current grade).

Figure ES-1 provides a summary of the impact findings for students in the high-risk subgroup. It shows first that, without access to an Academy, a high percentage of non-Academy students in the high-risk subgroup had become even more disengaged from school. In all, 32 percent of these students dropped out of high school, and only 26 percent had earned sufficient credits to meet the district's graduation requirements by the end of their scheduled 12th-grade year.

- **Among students at high risk of school failure, Career Academies significantly cut dropout rates and increased attendance rates, credits earned toward graduation, and preparation for post-secondary education.**

Figure ES-1 shows that the Career Academies produced substantial improvements in many educational outcomes for students in the high-risk subgroup. In particular, while 32 percent of the non-Academy students in the high-risk subgroup dropped out of high school, 21 percent of the Academy students did so. This 11 percentage point difference represents a one-third reduction in the dropout rate for the non-Academy group. This can be classified as a particularly large reduction in dropout rates. Reductions of this magnitude are rare for school-based interventions.

The Academies also significantly increased average attendance throughout high school for students in the high-risk subgroup (not shown in Figure ES-1). Average attendance rates throughout high school were approximately 76 percent for students in the non-Academy group, compared with 82 percent for students in the Academy group. This amounts to an additional 11 days of school per year over four years.

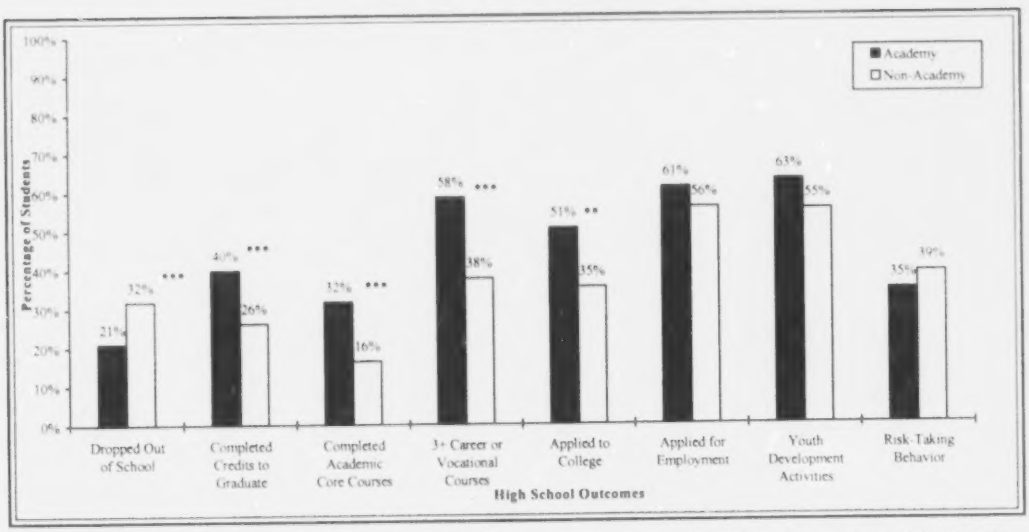
Moreover, while 26 percent of the high-risk non-Academy group had earned enough credits to meet district graduation requirements, 40 percent of the students in the Academy group did so (an increase of over 50 percent beyond the non-Academy group average). This suggests that, besides improving attendance and preventing students from dropping out, the Academies helped a significant portion of the high-risk subgroup to make up enough of the initial gap in credits earned to meet the district's graduation requirements three year later.

Also, as indicated by the third set of bars in Figure ES-1, the Academies doubled the percentage of students in the high-risk subgroup who completed a basic core academic curriculum (four English courses, three social studies courses, two math courses, and two science courses). At the same time, students in the Academy group were significantly more likely than their non-Academy counterparts to complete three or more career-related or vocational courses.

The fifth set of bars in Figure ES-1 indicates that the Academies increased the percentage of students in the high-risk subgroup who reported that they had submitted an application to a two-year or four-year college by the end of their 12th-grade year. In particular, 35 percent of students in the high-risk non-Academy group reported submitting a college application, compared

Figure ES-1

Career Academy Impacts on High School Outcomes in the High-Risk Subgroup



SOURCES: MDRC calculations from the Career Academies Evaluation Student School Records and 12th Grade Survey Databases.

NOTE: A two-tailed t-test was applied to differences between Academy and non-Academy groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

with 51 percent in the Academy group. Academy students in the high-risk subgroup were also more likely to report taking the SATs or ACTs (not shown in the figure).

Finally, the last two sets of bars in Figure ES-1 indicate that Academies did not produce a systematic change in involvement in positive youth development activities or in negative risk-taking behaviors. Positive youth development activities included participation in community volunteer work, receiving recognition for participation in academic or extracurricular activities, and receiving an academic award. Negative risk-taking behaviors included coming to school on drugs, becoming a parent, being expelled from school, and being arrested. Although the differences between the groups shown in Figure ES-1 were not statistically significant, they indicate trends in a positive direction.

Career Academy Impacts for Students in the Low-Risk Subgroup

Figure ES-2 presents a summary of the impact findings for students in the low-risk subgroup. The results for the non-Academy group indicate that, even without access to the Academy intervention, these students appear to be unlikely to disengage from school. For example, as the first set of bars in Figure ES-2 illustrates, only 3 percent of the non-Academy students in the low-risk subgroup dropped out of high school before the end of 12th grade. Almost the same percentage of Academy students (2 percent) dropped out.

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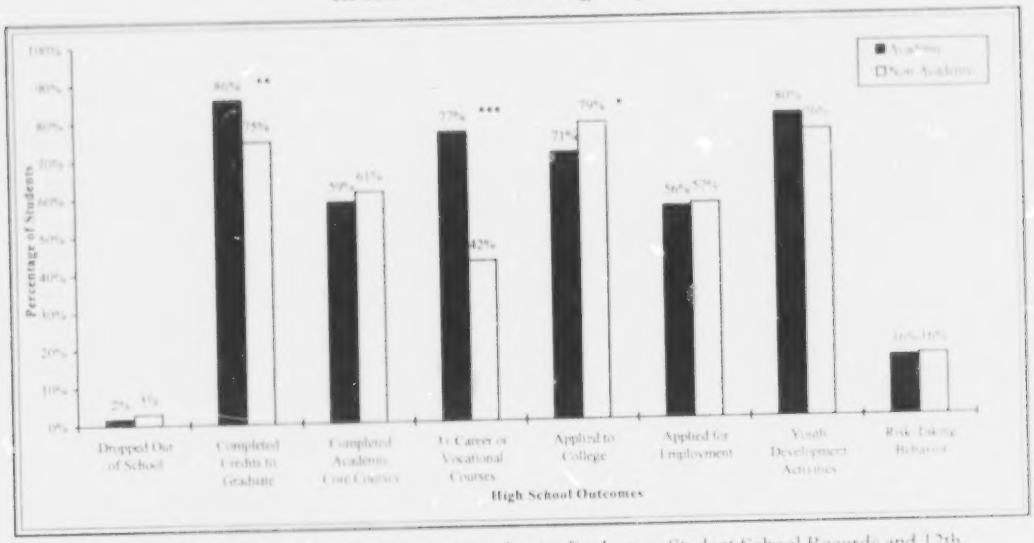
Figure ES-2

Career Academy Impacts on High School Outcomes in the Low-Risk Subgroup



SOURCES: MDRC calculations from the Career Academies Evaluation Student School Records and 12th Grade Survey Databases.

NOTE: A two-tailed t-test was applied to differences between Academy and non-Academy groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

- **Career Academies increased the likelihood that students in the low-risk subgroup were prepared to graduate on time. For these students, the Academies also increased career-related and vocational course-taking without reducing the likelihood of completing a basic academic core curriculum.**

The second set of bars in Figure ES-2 indicates that the Academies increased the percentage of students in the low-risk subgroup who earned sufficient credits to meet their district's graduation requirement. The figure shows that 86 percent of the Academy students met their districts' graduation requirement, compared with 75 percent of the students in the non-Academy group.

Also, while approximately equal percentages of Academy and non-Academy students in the low-risk subgroup completed a basic core academic curriculum, the Academies significantly increased the percentage who completed at least three career-related or vocational courses. It should be noted than many students in the low-risk non-Academy group were likely to be enrolled in their high school's college preparatory programs and courses. Thus, the Academies increased vocational course-taking for the low-risk subgroup while enabling students to complete as many core academic courses as their non-Academy peers.

The fifth set of bars in Figure ES-2 indicates that the Academies reduced the percentage of the low-risk subgroup who reported that they had submitted an application to a two-year or four-year college by the end of their 12th-grade year. Among these students, 79 percent of the

25 BEST COPY AVAILABLE

non-Academy group reported submitting a college application, compared with 71 percent of the Academy group. Although not shown in the figure, this occurred despite the fact that Academy and non-Academy students were equally likely to have taken the SATs and ACTs. In addition, over 85 percent of students in both low-risk groups reported that they had conducted at least a modest amount of research on college options during their 12th-grade year.

Figure ES-2 also shows that Academy and non-Academy students in the low-risk subgroup were equally likely to pursue post-secondary employment opportunities. Further analyses indicated that the Academies do not appear to have induced students to pursue post-secondary employment opportunities *instead* of either a two-year or four-year college. Further follow-up is needed to determine the effects that the Career Academies may have had on actual college enrollment and employment during the years following high school graduation. This will be explored further in subsequent reports from the Career Academies Evaluation.

Finally, the last two sets of bars in Figure ES-2 show that the Academies did not produce statistically significant changes in the low-risk subgroup's involvement in positive youth development activities or risk-taking behavior.

Career Academy Impacts for Students in the Medium-Risk Subgroup

- **On average, the Career Academies produced little or no change in outcomes for students in the medium-risk subgroup. Results for medium-risk students differed considerably across the participating sites.**

The medium-risk subgroup represents approximately 50 percent of the students in the study sample. As shown in Table ES-1, the characteristics of this subgroup do not provide a clear indication of likely school success or disengagement. Figure ES-3 presents a summary of impact findings for students in the medium-risk subgroup. The figure indicates that, on average, the Academies had little or no impact on most outcomes for these students. As discussed below, however, the results for the medium-risk subgroup differed dramatically across the participating sites.

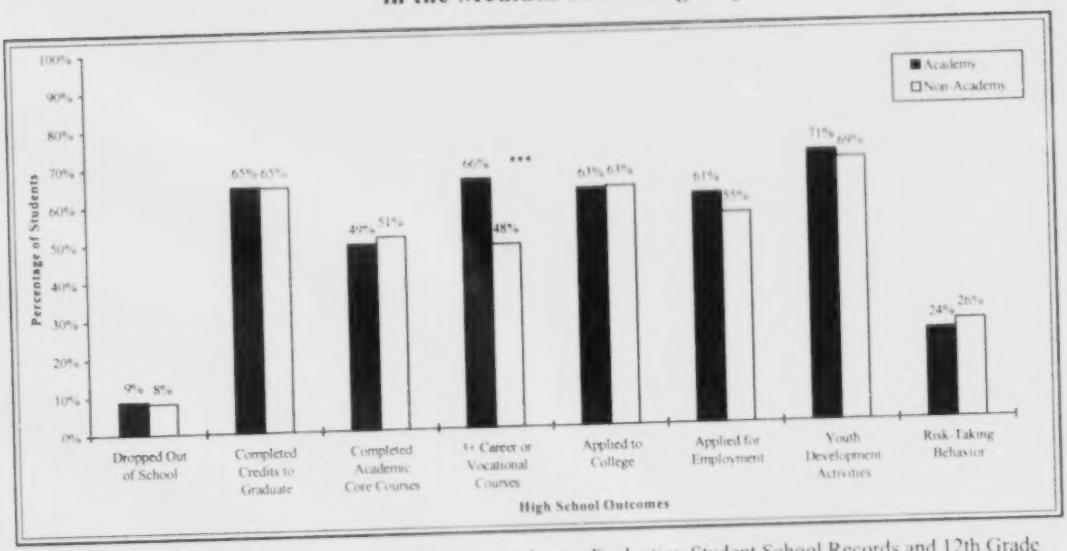
Impact Findings for the Full Sample

- **When averaged across the diverse groups of students and sites participating in the evaluation, it appears that the Career Academies produced only modest improvements in students' engagement and performance during high school.**

Figure ES-4 provides a summary of impact findings that are averaged across the full sample of students in the study. It suggests that the Academies produced only slight (and not statistically significant) reductions in dropout rates and in student involvement in negative risk-taking behaviors. On average, the Academies produced modest increases in the percentage of students who earned sufficient credits to meet district graduation requirements and in student involvement in youth development activities. In keeping with one of the central features of the Academy approach, Figure ES-4 indicates a more substantial increase in vocational course-taking. This increase did not come at the expense of students' being less likely to complete at

Figure ES-3

Career Academy Impacts on High School Outcomes in the Medium-Risk Subgroup



SOURCES: MDRC calculations from the Career Academies Evaluation Student School Records and 12th Grade Survey Databases.

NOTE: A two-tailed t-test was applied to differences between Academy and non-Academy groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

least a basic core academic curriculum. In general, however, according to the full sample findings, the Career Academies tended to produce small, positive (but not statistically significant) impacts on many student outcomes. As discussed earlier, these aggregate findings mask a great deal of underlying variation that sheds light on the potential strengths and limitations of the Academy approach.

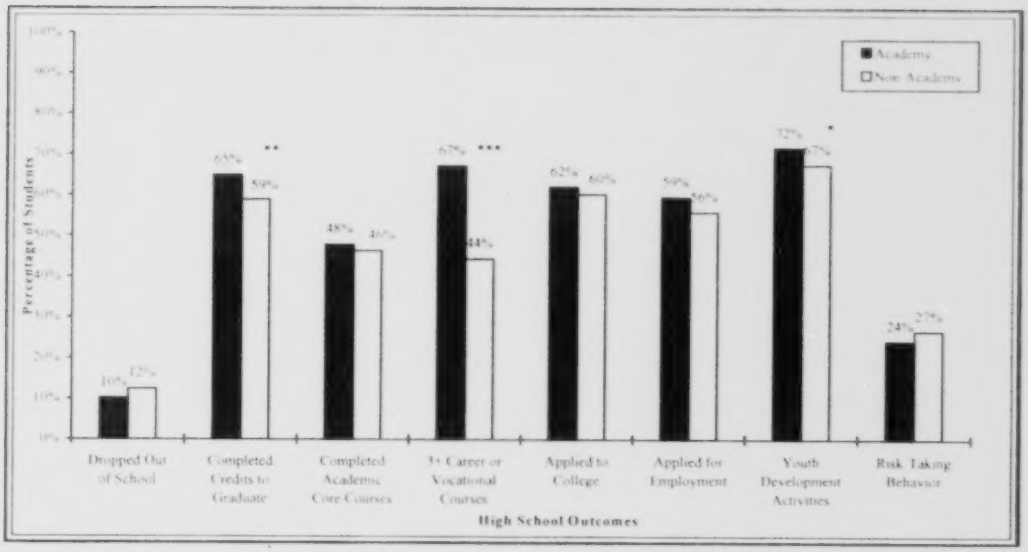
- **The Career Academies did not improve standardized measures of reading and math achievement either on average or for any subgroup of students.**

According to standardized achievement tests completed by 490 students in the study sample, the Career Academies did not produce any systematic improvement in students' math and reading test scores. Although impacts on test scores followed trends found for other outcomes, such as academic course-taking, there was no clear pattern of increases or decreases either on average or among the risk subgroups.

Among students in the high-risk subgroup, average math and reading test scores for the Academy group were somewhat higher than scores for the non-Academy group. While none of the differences was statistically significant, test scores followed this subgroup's trend of increases in academic course-taking and total credits earned toward graduation. Academy students in the low- and medium-risk subgroups had slightly lower reading test scores than their non-Academy counterparts. This is consistent with the slight (but not statistically significant) reduction in academic course-taking, which was found to be more highly correlated with reading test

Figure ES-4

Career Academy Impacts on High School Outcomes for the Full Study Sample



SOURCES: MDRC calculations from the Career Academies Evaluation Student School Records and 12th Grade Survey Databases.

NOTE: A two-tailed t-test was applied to differences between Academy and non-Academy groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

scores than was non-academic course-taking. There was almost no difference in math test scores between Academy and non-Academy students in the low- and medium-risk subgroups.

Several factors may account for these test score findings. First, qualitative field research information collected for this evaluation indicated that academic curricula and instruction in most of the Career Academies did not differ substantially from those of typical high schools; Academy teachers were required to cover the same basic material as teachers of the same subjects in the rest of the high school. Nor were Academy teachers typically provided with professional development opportunities beyond those offered to their non-Academy counterparts, which focused on standard-setting and instructional strategies in the academic subjects.

Second, there were some important differences between the sample of students who completed the math and reading achievement tests and those who did not. In particular, the magnitude of impacts for the achievement test sample was somewhat smaller and more mixed than the magnitude of impacts described above. For example, among students in the high-risk subgroup who completed the math and reading tests, the Academies produced a somewhat smaller reduction in dropout rates and a somewhat smaller increase in academic course-taking compared with the impacts displayed in Figure ES-1. Among students in the medium-risk subgroup who completed the test, it appears that the Academies actually reduced academic course-taking. In short, the test score sample does not appear to be representative of the full study sample. Nonetheless,

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there was not a systematic difference in background characteristics between the Academy and non-Academy students in the achievement test sample. Thus, test score impact estimates provide a reliable indication of the Academies' impact (or lack of impact) on test scores.

Finally, the types of standardized measures of achievement used in this evaluation, and in many school districts, may not adequately capture learning gains that Academy students achieve relative to their non-Academy counterparts. As discussed in an earlier report from this evaluation, Academy teachers were more likely than their non-Academy colleagues to state that they made explicit efforts to plan lessons and activities that cut across academic and non-academic subject areas.[7] They were also more likely to have students focus on problem-solving activities and to integrate problems and examples from the world of work into their lessons. Academy students were more likely than their non-Academy peers to indicate that they received instruction that included cross-discipline integration and connections between school-based and work-based learning. If the potential benefits of such activities and experiences are of value to schools, they will likely need to be measured through some alternative forms of assessment.

What Factors Help Explain the Pattern of Career Academy Effects?

Figure ES-5 illustrates a conceptual model of the pathways through which the core organizational features of the Career Academy approach are hypothesized to affect student outcomes during high school and beyond. The first column of the figure lists the three core organizational elements of the Career Academy approach: (1) the school-within-a-school, (2) the integrated academic and vocational curricula based on the Academy's career theme, and (3) the employer partnerships. Three types of supports and learning opportunities (the second column in Figure ES-5) are hypothesized to evolve from the core organizational elements and their interaction: (1) enhanced interpersonal support through the intensive collaboration offered by the school-within-a-school, (2) focused curricula and enriched teaching and learning through the combination of academic and vocational courses, and (3) exposure to career awareness and work-based learning opportunities through the employer partnerships. Together, these supports are intended to increase students' school engagement and prevent them from dropping out, enhance their performance and help them meet graduation requirements and prepare for post-secondary education and employment, and promote constructive use of non-school hours by increasing developmentally appropriate activities and reducing risk-taking behaviors.

For this report, a variety of analyses were aimed at assessing the relationships between student outcomes and measures of supports and learning opportunities that are likely to arise from the Career Academy's organizational elements. The findings from these analyses suggest that the strongest associations appear to exist between the interpersonal supports students received early in high school and various measures of their subsequent engagement and performance. The interpersonal supports include students' perceptions of their teachers' expectations for them, personalized attention they receive from teachers, the degree to which they see their peers as being engaged in school, and the degree to which they have opportunities to work collaboratively with peers.

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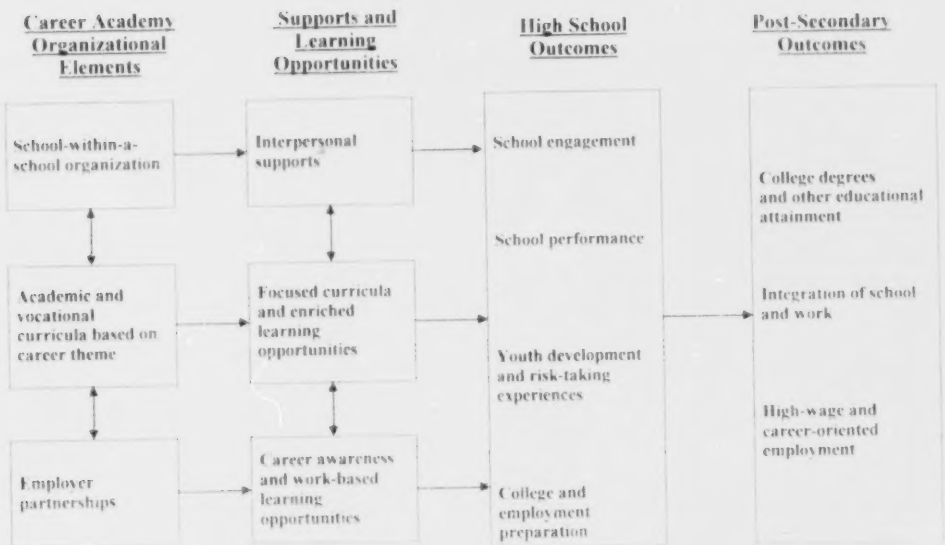
[7] James J. Kemple, "Selected Dimensions," cited above.

Both Academy and non-Academy students who reported that they received particularly high levels of support from their teachers and peers in 9th or 10th grade were less likely to drop out of high school, exhibit chronic absenteeism, or engage in risk-taking behaviors than were students who reported lower levels of interpersonal support. They were also more likely to make steady progress toward graduation and to engage in positive youth development activities. One should be cautious about making inferences about causal relationships in this regard. For example, students who achieve positive outcomes may attract strong support from teachers and peers, rather than the other way around. Nevertheless, the patterns of cross-site impacts described below provide further evidence that interpersonal supports are likely to be important antecedents to positive outcomes for students.

Figure ES-5
Career Academies Evaluation

Simplified Conceptual Model of the Career Academy Approach



- **In several participating sites, the Career Academies represented a particularly dramatic contrast with their non-Academy school environments. Specifically, these Academies produced particularly large increases in the level of interpersonal support students received early in high school, relative to the level experienced by students in the non-Academy environments.**

To explore the relationship between changes in the school environment that the Academies represent and the impact that Academies have on student outcomes, the evaluation attempted to identify sites in which Academies produced the largest differences in the level of interpersonal support students experienced. Specifically, the individual sites in the evaluation were

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ranked according to the difference between the percentages of Academy and non-Academy students who reported receiving a high level of support from teachers and peers during 9th or 10th grade. For the purposes of this report, the sites with the largest differences are referred to as *high-contrast Academies*. In the remaining sites, there was little difference in the level of support reported by Academy and non-Academy students; these sites are referred to as *low-contrast Academies*.

Finally, there are several important similarities between the two groups of sites. Both high-contrast and low-contrast Academies produced substantial increases in students' exposure to career awareness and development opportunities and their participation in work-based learning activities. It should be noted, however, that within the two groups of sites, some Academies produced much larger increases in students' exposure to these activities and experiences than others.

- **The high-contrast Academies produced a consistent pattern of positive impacts for students in the medium-risk subgroup. On average, the low-contrast Academies increased dropout rates and reduced academic course-taking among these students.**

The patterns of impacts for students in the medium-risk subgroup differed dramatically between the high-contrast Academies and the low-contrast Academies. As shown in Figure ES-6, in general the high-contrast Academies produced impacts that were similar but smaller in magnitude to impacts for students in the high-risk subgroup (Figure ES-1): they reduced dropout rates, increased credits earned toward graduation, and increased the percentage of students completing a basic core academic curriculum. Figure ES-6 also indicates that the low-contrast Academies actually increased dropout rates and reduced the percentage of students who completed a basic core curriculum.

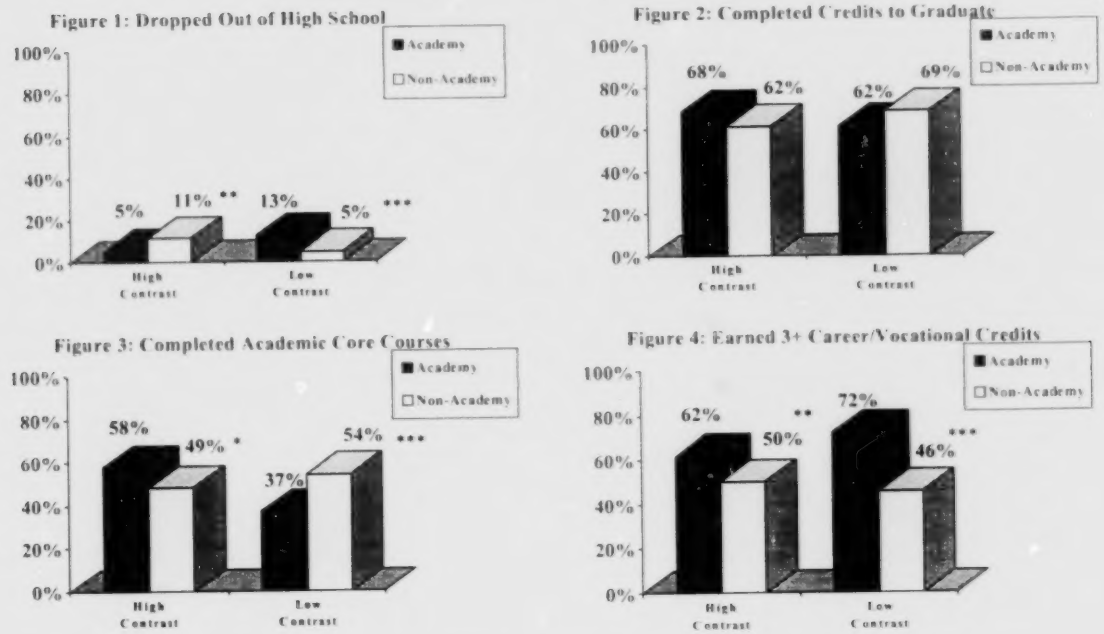
While it is not possible to pinpoint the source of differences in impact findings for high- and low-contrast Academies, differences in program implementation may suggest some explanations. For example, qualitative field research information collected for the evaluation indicated that the high-contrast Academies tended to have implemented a tighter school-within-a-school organization compared with the low-contrast sites. The high-contrast Academies typically included a core group of four or five teachers whose responsibilities fell almost exclusively within the Academy. The vast majority of students in high-contrast sites were scheduled together in at least two or three core courses, and very few non-Academy students had to be included in the Academy classes (for example, to ensure adequate enrollments). The high-contrast Academies also tended to be located in a distinct area of the school building or campus. These features of the high-contrast Academies may have nurtured a more personalized learning environment and helped students and teachers feel that they were part of something unique within the school. The tightly organized school-within-a-school may also have served as a foundation for enhancing instructional supports, curriculum integration, and connections between school and work.

The school-within-a-school organization of the low-contrast Academies tended to be more loosely structured and typically included several teachers who had responsibilities both in and outside the Academy. A number of Academy students in low-contrast sites were scheduled in non-Academy sections of core courses, and several of the Academy classes included non-Academy students in order to ensure adequate enrollments. These aspects of program implementation tended to minimize the contrast between the Academy and non-Academy environments. It is difficult to de-

termine how this might account for the apparent reduction in school engagement among the medium-risk subgroup in these sites. It may be that without a tightly organized, highly supportive school-within-a-school environment, the other aspects of the Academy experience (additional vocational courses, career awareness activities, and work-based learning) may have become somewhat of a distraction or burden.

Figure ES-6

Career Academy Impacts on High School Outcomes for Students in the Medium-Risk Subgroup, by High-Contrast and Low-Contrast Academies



SOURCE: MDRC calculations from the Career Academies Evaluation Student School Records Database.

NOTE: A two-tailed t-test was applied to differences between Academy and non-Academy groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

In general, the patterns of impacts for the high-risk and low-risk subgroups were consistent across both groups of sites, with two notable exceptions. First, the low-contrast Academies produced a somewhat larger reduction in dropout rates among the high-risk subgroup. Although the difference in impacts on dropout rates was not statistically significant, this pattern is not consistent with the hypothesis that greater enhancement of interpersonal supports should lead to larger reductions in dropout rates. It is not clear what accounts for the pattern. Second, the low-contrast Academies produced somewhat larger increases in vocational course-taking for both the high-risk and the low-risk subgroups. This may reflect a greater emphasis on vocational course-taking in low-contrast sites and the fact that, on average, relatively few non-Academy students in these sites completed three or more career-related or vocational courses during high school.

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Policy Implications and Lessons for Practice

Although the story of the Career Academies' longer-term effectiveness is not yet complete, the findings to date suggest the following implications and lessons.

- **The Career Academies in this study demonstrate the feasibility of implementing a well-defined and effective approach to creating a more supportive high school environment and increasing students' exposure to career awareness and work-based learning activities.**

Large comprehensive high schools (including those participating in this study) have been criticized for being impersonal and for preventing students and teachers from working as teams to create a sense of community and common values. Students in such schools do not have a consistent group of teachers who are accountable for their success, and they see few of the same classmates from course to course. Teachers rarely share the same group of students with a small number of colleagues, and they have few opportunities to coordinate their coursework with teachers in other disciplines. The findings from this evaluation provide evidence that the Career Academies can provide well-defined and effective approaches to addressing such problems.

Another common problem identified in high schools is that students and teachers are isolated from other institutions in the community, particularly employers. Such isolation insulates students from the world of work and misses an opportunity to provide them with learning-oriented exposure to it at a particularly formative point in their development. With few connections among classes or between school and work, many students are inadequately informed about or are unprepared for post-secondary education and employment opportunities. Even with the rise of the school-to-work movement and with the federal School-to-Work Opportunities Act of 1994, there has been a struggle to identify widely implemented strategies that address these concerns. The findings from this evaluation indicate that Career Academies can provide concrete examples of partnerships between schools and employers and can substantially enhance students' exposure to career development and work-based learning opportunities.

- **Career Academies are an effective means of enhancing the school engagement of students who are at high risk of dropping out of high school.**

Many of the students served by Career Academies enter high school at a substantial risk of dropping out; many others are likely to become psychologically disengaged from school and to make only limited progress toward graduation. Some of these students have already fallen behind or are disengaged when they enter high school, while others come from home environments that lack the support or resources to facilitate academic persistence and success. Without the intervention of the Academies, about 1 in 3 of these young people will drop out of high school. Previous research has shown that the economic and social costs of not securing a high school diploma are extremely high.

The findings from this evaluation show that the Career Academies substantially reduced dropout rates and substantially improved a variety of measures of school engagement among students in the high-risk subgroup. Not only are effects of this magnitude and pervasiveness rare in the world of education policy interventions, but the long-term payoff, if the effects persist, is likely to be large.

- **Career Academies should continue to serve a heterogeneous student population.**

Because the largest and most pervasive positive effects in this evaluation were found among students in the high-risk subgroup, it might be argued that the Career Academies should serve only such students. This approach is likely to create a number of problems, however. First, Career Academies have explicitly attempted to move away from targeting students on the basis of their estimated trajectories for school success in order to avoid the tracking and stigma that have been associated with vocational and career-related programs. Second, and perhaps more important, it is likely that exposure to a broad cross-section of students — particularly those who enter the programs highly engaged in school — is an important factor driving the positive effects of Career Academies on the high-risk subgroup. Perhaps the presence of other, highly engaged students in their classrooms helps increase teachers' attention to and expectations for all students. Excluding engaged students, therefore, would dramatically change the nature of the Academy experience for students at high risk of dropping out.

- **Interpersonal supports appear to be necessary conditions for maximizing the positive effects Career Academies have on student engagement. The school-within-a-school organization can provide an effective strategy for enhancing these supports.**

The findings indicate that enhancing interpersonal supports may be a key element of school reform initiatives aimed at increasing retention and engagement in school. A highly structured school-within-a-school organization can provide some of the necessary conditions for promoting such supports as personalized attention and high expectations from teachers, high levels of peer engagement, and opportunities for teachers and students to work collaboratively. Career Academies that did not complement their career awareness and work-based learning activities with increased supports (relative to what was already available in the regular school environment) risked having some of their students become disengaged from school.

- **Although Career Academies provide a number of supports necessary to keep students engaged in school, these have not been sufficient to enhance achievement, at least as measured by commonly used standardized tests.**

The primary added value of Career Academies appears to rest on their enhanced interpersonal supports and increased access to career awareness and work-based learning opportunities. Although these factors may be necessary to keep many students engaged in school, they were not sufficient to improve student achievement. The findings from this evaluation indicate that the Career Academies were quite similar to regular school environments in terms of their academic curricula and typical instructional strategies. From this standpoint, it should not be too surprising that the Academies did not I mprove student achievement as measured by the standardized math and reading tests used in the evaluation. Academies face many of the same challenges that most high schools do in providing teachers and students with appropriate incentives and supports to ensure that they focus on clearly specified learning objectives and that they have the capacity to meet those objectives. The personalized and collaborative nature of the Career Academy's school-within-a-school organization can serve as a solid foundation on which to build these enhancements.

There is also a question about whether current assessment instruments (including the achievement tests used in this evaluation) adequately capture the distinctive learning gains that Academy students may attain. Such skills may include, for example, the type of work-related competencies outlined in the Secretary's Commission on Achieving Necessary Skills (SCANS) or the presentation and organizational skills often exhibited in student portfolio assessments. In order to measure such potential benefits of a Career Academy, school officials may want to consider incorporating alternative forms of student and teacher assessment. They may also want to develop forums that recognize efforts by teachers to integrate academic course content with the applied learning and problem-solving approaches of high-quality vocational curricula. Few examples of such assessments and incentives currently exist.

- **Longer-term follow-up is needed to ascertain the effects of Career Academies on post-secondary labor market and educational outcomes.**

The results in the report summarize the effects that the Career Academies have had on students through the end of the year they were scheduled to be in 12th grade. The data do not include complete information about actual high school graduation rates or about the critical transition between high school and post-secondary education and work. Further follow-up is needed in order to get a more complete picture of the Academies' effectiveness and limitations. For example, it will be important to determine whether the reduction in dropout rates among students in the high-risk subgroup translates into higher levels of educational attainment or whether these students simply remain in school longer without earning a diploma or do not go beyond high school. It will also be important to determine whether the Career Academy experience helped or hindered students in the low-risk subgroup, particularly regarding their actual rates of college enrollment and completion. Ultimately, measures of success for Career Academies are likely to depend, in part, on whether the students they attempted to serve are better attached and more successful in the labor market than their non-Academy counterparts.

In order to examine these issues, MDRC's Career Academies Evaluation will continue through 2003, following the students in the study sample for up to four years after their scheduled graduation from high school. As part of this second phase of the evaluation, MDRC will be administering follow-up surveys to students in the study sample at one year and four years following their scheduled graduation. These surveys will provide information about whether the students' actually graduated from high school (or received an alternative credential) and about their enrollment and progress through post-secondary education, their labor market experiences, their preparation and planning for the future, and a range of youth development experiences.

Chapter 1

Introduction

This report summarizes results from the first phase of the Career Academies Evaluation being conducted by the Manpower Demonstration Research Corporation (MDRC). Career Academies have existed for over 30 years and have been implemented in approximately 1,500 high schools across the country. The durability and broad appeal of the Academy approach can be attributed, in part, to the fact that its core features offer direct responses to a number of problems that have been identified in large comprehensive high schools.

Career Academies attempt to create more supportive and personalized learning environments through a school-within-a-school structure. Their curricula combine academic and occupation-related course requirements that aim both to promote applied learning and to satisfy college entrance requirements. Academies establish partnerships with local employers to build sequences of career awareness and work-based learning opportunities for their students. The primary goals of the Career Academy approach are to enhance students' performance in high school and provide them with the credentials and skills needed to make a successful transition to post-secondary education and, eventually, a career.

This is the latest in a series of reports and papers from MDRC's Career Academies Evaluation, which is being funded by the U.S. Departments of Education and Labor and 17 private foundations and organizations. It adds to findings presented earlier in this evaluation in several ways.

First, this report assesses the impact Career Academies have on students' high school engagement and performance and on their preparation for post-secondary education and employment. The previous reports from this study presented descriptive information about the Academy programs and focused on measures of students' exposure to key dimensions of the Academy approach earlier in their high school careers. This report adds to these findings by following students in the study sample through the end of their 12th-grade year and by examining a much more extensive set of student outcomes. It assesses the impact Career Academies have on keeping students enrolled and engaged in school, on the types of courses they take, on math and reading achievement test scores, on participation in extracurricular activities, on risk-taking behaviors, and on whether students are prepared to enter post-secondary education and employment. As discussed later in this chapter, the evaluation is built on a random assignment research design that can provide unusually rigorous evidence about the impact Career Academies have on students.

Second, this report examines the relative effectiveness of the Academy approach for several key subgroups of students and among the sites represented in the study sample. The previous reports and papers from MDRC's Career Academies Evaluation focused primarily on findings that were aggregated across the full sample of students and sites in the study sample. While such findings shed light on the implementation and impact of the Career Academy approach more generally, they mask the extent to which the Career Academies may change certain outcomes for some students but not necessarily for others. They also mask the high degree of variation among the sites and the ways this variation may be associated with differences in effectiveness. A central goal of

this report, therefore, is to determine how the manner and context in which Career Academies are implemented affect their capacity to make a difference for students.

Third, this report attempts to push much further in offering lessons about the efficacy of the Career Academy approach and of other school reform initiatives that are embedded in it. While the findings presented here provide an assessment of the effectiveness of particular Career Academies, the study design and the available data provide unique opportunities to go beyond this. For example, the sites vary significantly in terms of the types of interpersonal and instructional supports they offer students and in the types of work-related learning opportunities they provide. The contrast among the sites and the differences in effectiveness for key subgroups of students provide a rich context for making judgments about what types of school reform initiatives are likely to be effective and for whom.

Finally, this report serves as a platform for further analyses to determine the long-term impact of the Career Academy approach. MDRC's Career Academies Evaluation is scheduled to continue until 2003, following students for up to four years beyond high school. During this second phase of the evaluation, MDRC will prepare additional reports examining the effect Career Academies have on students' post-secondary outcomes and exploring connections between high school experiences and success in higher education and the labor market.

The remainder of this introductory chapter sets the context for the Career Academies Evaluation and this report. It is divided into four sections. Section I presents a short history of the Career Academy approach and sets the current policy context for the evaluation and its findings. Section II reviews findings from previous research on Career Academies and highlights areas where the current evaluation can fill important gaps in what is known about their effectiveness. Section III describes a conceptual framework for understanding the Career Academy approach and its potential effects on students during high school and beyond. Section IV describes several key features of the Career Academies Evaluation design that are particularly relevant to this report.

I. The Origins of the Career Academy Approach and the Policy Context for This Report

The interpretation and significance of the findings from this evaluation should be viewed in the context of both the history of the Career Academy approach and the current policy initiatives that intersect with that history. This section of the chapter provides a brief summary of the origins of the Career Academy approach and an overview of the policy context into which this report will be released.

A. The Origins and Growth of the Career Academy Approach

The first Career Academy was established in 1969 in Philadelphia, Pennsylvania.[1] This Electrical Academy was designed primarily as a vocational training program targeted to non-

[1]For a more detailed history of the Career Academies, see Stern, Raby, and Dayton, 1992; Academy for Educational Development, 1989; Snyder and McMullan, 1987. The term *Career Academy* was designated by Stern, Raby, and Dayton to encompass all the various strands of academies that had evolved up to that point.

college-bound students. Building on the Philadelphia experience, in the 1980s, the Edna McConnell Clark Foundation provided initial funding to establish Academies in Pittsburgh, Pennsylvania; Portland, Oregon; and Menlo-Atherton and Redwood City, California. Based on the experience of the programs established in Menlo-Atherton and Redwood City (known as the Peninsula Academies), the California State Legislature passed a bill providing funding for up to 10 school districts to establish new Academies (later referred to as California Partnership Academies) beginning in the 1985-86 school year. Meanwhile, the American Express Company, in collaboration with the New York City Public schools, established Academy programs focused on the financial industry. By the end of the 1980s, it is estimated that there were over 100 Academies in Philadelphia, California, and the cities that received Clark Foundation start-up grants or support from the American Express Company.

These early Career Academies shared several characteristics that have important implications for the current state of Academies and the Academy movement. First, the initial Academies were primarily vocational education programs targeted for students who appeared to be at high risk of dropping out of high school. The central goals of these early programs were to keep students engaged in school, provide them with work-related learning experiences both in the classroom and on the job, and establish clearer pathways between high school and work. This vision for the Career Academy approach was adopted, in large part, to deal with many of the major problems that were identified with American high schools in the 1970s and 1980s. In fact, the legislation authorizing funding for the California Partnership Academies expressly states that the programs must target "educationally disadvantaged high school students," defined as "students who are at risk of dropping out of high school."[2]

Second, the early programs in Philadelphia and California established the basic organizational elements that eventually came to define the Career Academy approach as a distinctive high school reform initiative. They were organized as schools-within-schools and used a career theme to help coordinate academic and vocational curricula. Each of the programs also established partnerships with local employers to build connections between school and work for its students, and to secure funding for the programs. Although these organizational features were not used explicitly to define the Career Academy approach until recently, they were clearly identifiable and could be replicated under a wide range of circumstances.[3]

Third, beginning with the very first Academies in Philadelphia, there have been efforts to document their success and to justify their ongoing operation and expansion on the basis of their evidence. The initial replications sponsored by the Edna McConnell Clark Foundation were undertaken, in part, because of the documented success of the Philadelphia Academies. The Clark Foundation, along with the William and Flora Hewlett Foundation, also provided funding for an evaluation of the first 10 California Academies. The evidence from this evaluation played a key role in extending and expanding the state legislation to create many more Academies. In addition to evaluation research, the initial Academies were the subject of implementation research to document strategies for creating and sustaining new programs. This research and documentation

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[2]Stern, Raby, and Dayton, 1992.

[3]Researchers, policy advisors, and practitioners at the Career Academy Support Network engaged in an extensive consensus-building process among various organizations and individuals associated with Career Academies to arrive at a commonly agreed-upon definition of a Career Academy. This definition is articulated in Stern, Dayton, and Raby, 1998.

led to more systematic technical assistance and staff development efforts for both existing Academies and those in the planning stages.

B. The Current State of the Career Academy Movement

The 1990s have seen extraordinary growth in the number of Career Academies around the country. Currently, there are estimated to be approximately 1,500 Career Academies nationwide (nearly a 15-fold increase over 10 years) and many more in the planning stages. Much of this growth can be traced to the increasing number of national, state, and district Academy support networks. As of the 1998-99 school year, the California Department of Education has provided funding for nearly 200 Partnership Academies. It also provides support for several technical assistance and professional development services, including an annual conference. In addition to the state-funded Partnership Academies, there are estimated to be over 200 other Academies in California that are patterned after the Partnership Academy model but are supported through local efforts. Building on the California legislation and Partnership Academy model, Illinois, Florida, Hawaii, and other states have also established statewide networks of Academies. In 1988, a consortium of business, labor, and education leaders established the Philadephia High School Academies (PHSA), Inc., to oversee the network of 28 Academies in Philadelphia. Since then, a growing number of other cities have developed Academy networks, including Atlanta, Baltimore, Chicago, Denver, Oakland, Pasadena, Seattle, and Washington, DC.

In 1988, the American Express Company and other employer partners established the National Academy Foundation (NAF) to coordinate the expansion and ongoing development of the Academy of Finance model. Since then, NAF has received its largest support from American Express and Citigroup and has grown to include nearly 400 Academies nationwide. The NAF model has also been expanded to include themes in travel and tourism and public service. Recently, NAF began work on an Information Technology Academy model.

More recently, there have been other initiatives to create national Academy support networks, and these networks have begun working together to coordinate their efforts. In 1996, the National Career Academy Coalition (NCAC) was established by a consortium of technical assistance providers including PHSA, Inc., and GMS Partners, which had been providing technical assistance to Academies in Washington, DC. NCAC received endorsements from several federal agencies led by the U.S. Department of the Treasury, and it offers an annual technical assistance conference for new and established Academies nationwide. In 1998, the Dewitt Wallace-Reader's Digest Fund provided funding to establish the Career Academy Support Network (CASN) based at the University of California at Berkeley. CASN had led an effort to build consensus for a definition of a Career Academy and has developed a range of technical assistance tools for states, school districts, and schools interested in creating new Academies.

In addition to growth in the number of Academies, there has been a shift in the primary goals and target population of most Career Academies. In particular, there is now wide agreement that the Career Academy approach should be explicitly distinct from traditional vocational education by seeking to prepare students for both work *and* college.[4] Vocational education, as defined in federal law and through its historical legacy, has been directed at preparing young

[4]See Stern, Dayton, and Raby, 1998, for a discussion of the current definition of a Career Academy and its key goals.

people for occupations that do not traditionally require advanced degrees. By contrast, Career Academies now seek to include a broad range of students and to combine a rigorous academic curriculum with exposure to extensive information about an industry, both in the workplace and in the classroom.

Finally, although most Career Academies today continue to share the approach's basic organizational elements, the Academy model has been adapted to a wide range of local needs and circumstances, resulting in different versions of the approach that emphasize some features over others. For example, the NAF network has focused a great deal on creating theme-related curricula in finance and travel and tourism, while many of the California programs placed somewhat greater emphasis on creating smaller learning communities through the school-within-a-school structure. Both types of programs have sought to develop strong employer partnerships. Even within the California, Philadelphia, and NAF expansion efforts there has been considerable variation in the roles employers played, the strategies used to integrate academic and vocational curricula, and the particular characteristics of their school-with-a-school organization. This variation highlights the adaptability of the Academy approach.

The expansion of the target populations and goals of the Career Academy approach, as well as the rapid growth in the number of Academies, has placed a premium on obtaining high-quality information about how the Academies may be affecting students' performance in high school. How well does the Academy approach fit the needs of college-bound students, as well as those who may be at high risk of dropping out? Are Academies more effective under some conditions than under others? Which aspects of the Academy approach make the most difference for students? MDRC's evaluation is intended to shed valuable light on these and other questions.

C. The Current Policy Context

This report is being released at a time when education policymakers and practitioners are pursuing a number of far-reaching strategies for improving American high schools. In addition to the rapid expansion of Career Academies and Academy support networks, there have been several policy and school reform initiatives that build on or directly incorporate the Career Academy approach. Most notably, the School-to-Work Opportunities Act (STWOA) of 1994 was designed to catalyze fundamental changes in the way states and localities support partnerships between employers and schools. These partnerships have been aimed at enhancing the relevance and rigor of school- and work-based learning and at creating clearer pathways between high school and post-secondary education and careers. STWOA specifically identifies Career Academies as a "preferred approach" to creating such partnerships and implementing the principles embedded in the legislation. States, school districts, and employers are now looking for strategies and approaches that can build on the foundation established by STWOA and address some of its limitations.

Federal education policymakers have been considering significant changes to the Elementary and Secondary Education Act (ESEA). Such changes are likely to build on proposals that have already been put forward to address problems unique to high schools. For example, the Educational Excellence for All Children Act of 1999 supports education reforms in 5,000 American high schools that will aid students by improving schoolwide Title I school programs, strengthening curricula and instruction and providing better professional development opportunities for school staff. The act emphasizes the need for creating smaller learning environments,

involving members of the community in schools, and establishing partnerships with other institutions as important ways to promote safer and more supportive schools. These are all elements that are present in the Career Academy approach.

The Office of Vocational and Adult Education (OVAE) has established the New American High Schools Initiative to showcase high schools that have implemented a diverse set of strategies for education reform, particularly focused on preparation for college and work. The initiative has provided evidence that high school reforms that are locally driven and standards-based are associated with better attendance and graduation rates for students.

Other researchers and reformers have also been developing a variety of approaches to improving high schools. These reforms include High Schools That Work (HSTW), developed by the Southern Regional Education Board. HSTW is a whole-school, research-based reform designed to raise the academic achievement of career-bound high school students by combining the traditional college preparatory curriculum with vocational classes. The Talent Development Model High School, developed at the Center for Research on the Education of Students Placed at Risk (CRESPAR), specifically includes Career Academies as a central feature of its reform approach. The program divides large, urban high schools into smaller learning communities: a 9th Grade Success Academy and Career Academies in grades 10 through 12. Project Graduation Really Achieves Dreams (GRAD) was developed by the Houston Public Schools and uses a combination of innovative programs to build students' interpersonal and academic skills. Project GRAD begins in elementary and middle schools and then, in high schools, seeks to implement personal mentoring relationships and financial incentives for college. Currently, Project GRAD is considering implementing a series of Career Academies within secondary schools to ensure that the gains made in elementary and middle school are sustained and enhanced by small learning communities and integrated curricula. Finally, the Institute for Research and Reform in Education (IRRE) has developed the First Things First (FTF) initiative in Kansas City, Kansas, to help improve feeder systems of elementary, middle, and high schools. The cornerstones of FTF are consistent with key features of the Academy approach, including efforts to create small learning communities; build strong relationships among students, parents, and teachers; and foster collaborative and active learning opportunities based on academic standards.

Virtually all these approaches to improving American high schools include principles embedded in the Career Academy approach and, in some cases, include the Career Academy model as an explicit component. The findings presented in this report will shed light on the extent to which the Career Academy model, and the key reform approaches embedded in the model, can achieve the goals that have been espoused by their proponents, including improving students' performance and engagement in high school as well as their preparation for post-secondary education and work.

II. Previous Research on Career Academies

MDRC's Career Academies Evaluation is built on a foundation laid by several earlier studies of Academies. Some of these have documented the feasibility and institutional growth of

the Career Academy approach in a range of local settings.[5] Other studies have included assessments of the Academies' effects on student outcomes, such as graduation from high school, enrollment in post-secondary education, and labor market participation.[6]

A number of studies have focused on the California Partnership Academies.[7] Several of these studies compared the performance of Academy students with that of other students in the same high schools who had similar demographic characteristics and prior records of low grades, high absenteeism, and disciplinary problems. The results indicated that the Academy students earned more credits and had significantly better attendance, grades, and graduation rates than students in the comparison groups. Other Partnership Academy studies have relied on school records or survey data that compare Academy students with the general high school population. These studies also found that Academy students and graduates outperformed their non-Academy peers.[8] These results have been highlighted as particularly impressive, given that the state-funded Partnership Academies are required to recruit a majority of students who have been identified as economically or educationally disadvantaged.

Outside California, several other studies using similar methodologies also reported positive results. Evaluations of Academies in Philadelphia found that Academy students had higher attendance and graduation rates than the citywide average.[9] An evaluation of Academies affiliated with the Junior Reserve Officers' Training Corps (JROTC) found positive effects on attendance, credits earned, grades, and dropout prevention.[10]

Despite the broad array of research on Career Academies, a number of questions remain unanswered. Most important, several of the prior studies recognized that the positive effects they found may actually under- or overestimate the true effects of the Academies on student outcomes.[11] On the one hand, it may have been that these effects were the result of the extra motivation of students who were attracted to the Academies rather than to the unique experiences offered by the programs. In other words, the Academies may attract students (even students whose background characteristics may indicate a risk of dropping out) who are motivated enough to do well under a wide range of circumstances. On the other hand, because many Academies explicitly attempt to serve at-risk students, the true effects of the programs may be understated in cases where such students are being compared with the general high school population, which includes many highly engaged and high-performing students. Many who conducted prior evaluations of Career Academies have emphasized that a random assignment research design would be necessary to eliminate these types of concern. In recognition of this, the California state legislature passed legislation in 1993 authorizing an evaluation of the Academies using random assignment of students under appropriate circumstances. The governor subsequently approved the present study as that evaluation.

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[5] Snyder and McMullan, 1987; Stern, Raby, and Dayton, 1992; Academy for Educational Development, 1989, 1990; Pauly, Kopp, and Haimson, 1995; Stern, Finkelstein, Stone, Latting, and Dornsife, 1994.

[6] For the most comprehensive summary of this research, see Stern, Raby, and Dayton, 1992.

[7] Stern, Dayton, Paik, and Weisberg, 1989; Stern, Raby, and Dayton, 1992.

[8] Maxwell and Rubin, 1997, 1999; Dayton, 1997; Reller, 1987.

[9] Snyder and McMullen, 1987; Academy for Educational Development, 1989; Linnehan, 1996.

[10] Hansner, Elliott, and Gilroy, 1999; Hanser and Stasz, 1999; Stasz, 1999.

[11] Stern, Raby, and Dayton, 1992.

A second important set of questions that has not received much attention concerns the variation in Academy effectiveness across a wide range of contexts and networks. On a related issue, little is known about the relative effectiveness of Academies for several key subgroups of students, such as those at high risk of dropping out of high school versus those highly likely to be college bound. MDRC's Career Academies Evaluation is positioned to answer these questions and fill other gaps in the research on Academies.

III. A Conceptual Framework of the Career Academy Approach and Its Potential Impact on Student Outcomes

The key goal of this evaluation has been to assess the extent to which Career Academies keep students engaged in school, help them progress toward graduation, and prepare them for post-secondary education and work. In an effort to shed light on how and why the Academies do or do not affect changes in these outcomes, the evaluation has attempted to articulate a conceptual framework, or theory of change, for the Career Academy approach. This framework identifies many of the key goals that have been proposed for Academies and attempts to make explicit some of the pathways through which the core elements of the approach are likely to improve outcomes for students. It has also been used to guide the design and implementation of several key features of the evaluation, including site selection, data collection, and analyses strategies.[12]

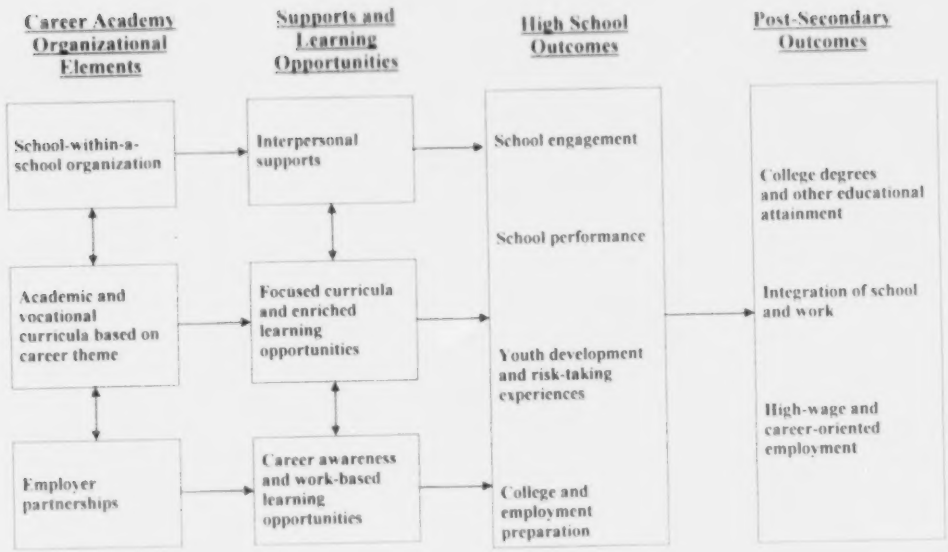
Figure 1.1 is a simplified conceptual model listing the basic Career Academy elements on the left and showing the hypothesized pathways through which these elements are likely to affect student outcomes during high school and beyond. The conceptual model covers four sets of constructs delineated by the four columns in Figure 1.1:

- **Career Academy organizational elements** that distinguish the Academy approach from the regular high school environments in which it is implemented;
- **supports and learning opportunities** that are intended to evolve from the organizational elements;
- **high school outcomes** that the Academies aim to improve by enhancing the supports and learning opportunities in the previous column; and
- **post-secondary outcomes** that reflect some of the long-term goals of the Academy approach.

[12]While the concept of grounding program evaluations in theories of change is not new (see Weiss, 1995, for a detailed discussion of theory-based evaluation strategies), this evaluation marks the first attempt to make the theory behind Career Academies more explicit and then to collect and analyze data to examine empirically the hypotheses embedded in the theory. As such, the conceptual framework articulated in this report, and in the previous reports from the study, does not necessarily reflect a previously agreed-upon set of program characteristics and underlying principles on which Career Academies have been planned, implemented, and sustained. As noted earlier, only recently has a commonly agreed-upon definition of a Career Academy been articulated and disseminated. Also, the history and diversity of Career Academies highlights the fact that the goals of the approach are broad and evolving.

Figure 1.1
Career Academies Evaluation

Simplified Conceptual Model of the Career Academy Approach



Linkages among these sections of the framework highlight the pathways through which the Academies are hypothesized to affect students' experiences and behaviors. The conceptual framework is described briefly below.

A. Career Academy Organizational Elements

School-Within-a-School Organization. In this organizational arrangement, clusters of students share several classes each day and often have the same small group of teachers from year to year. The student clusters vary in size but usually range from 30 to 60 students per grade in grades 9 through 12 or in grades 10 through 12. The number of classes students take within an Academy, and thus the number of teachers they share, also varies from Academy to Academy and from year to year, but usually students take from two to seven Academy classes. Teachers, who come from a variety of academic and vocational disciplines, are scheduled to have mostly Academy students in their classes. These teachers make a commitment to meeting with each other on a regular basis, and they share in decision-making related to administrative policies, curriculum content, and instruction. One teacher usually assumes lead responsibility for administrative tasks and serves as a liaison with the school principal and other administrators, school district officials, and employer partners. Students also take some regular classes along with the other students in the high school, and all courses in the Academy are counted as credits toward a high school diploma. Academy classes are often scheduled in blocks of three or four during the morning, leaving the remainder of the day for regular courses. This block scheduling allows for

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special activities during this time: field trips, for instance, or team teaching, or hosting speakers from the business community. Teachers also attempt to involve parents in the Academy program, and schools often require parents to attend meetings with their children.

Academic and Vocational Curricula Based on Career Theme. The Career Academies' curricula usually consist of three or more academic courses per year and at least one vocational or occupation-related course per year that focuses on the selected career theme. These classes enable students to meet high school graduation and college entrance requirements and, at the same time, provide them with marketable skills. Students take their remaining course requirements and electives (usually 20 to 50 percent of the credits needed to graduate) outside the Career Academy in the regular high school. To link the academic and occupational classes, Academy teachers work together to coordinate course content and instructional strategies. They also focus on providing instruction in employability skills, both in the occupational theme courses and in one or more academic courses. Occupational classes are structured around whole industries: Health Academies, for example, attempt to expose students to diverse medical occupations in the areas of direct care, technology, and administration. The Academy's career theme is typically chosen on the basis of local employment needs and demand for expertise in the national marketplace.

Employer Partnerships. Career Academies strive to build formal relationships with a group of employers in their community. In general, the employer partnerships can be defined as ongoing coordinated efforts to engage local employers in supporting the Academy's programs and sponsoring a range of work- and career-related activities for students. The partnership typically includes employer representatives, teachers, school administrators, parents, and students. Many Academies create formal advisory boards that provide guidance on curricular and extracurricular activity development and may even assist with the management and administration of the program. Employer partners typically support the Academies by providing additional material resources or even making financial contributions. Most important, however, is that employer partners contribute the time for their employees to appear as guest speakers in the school, supervise student internships, serve as mentors for individual students, and provide other kinds of support.

Many Career Academies designate staff who serve as liaisons between the employers and the Academies and coordinate the various employer-sponsored activities. This role is crucial in creating and sustaining the various career development and awareness activities that are offered to students, both in school and outside school. The people in this role also take responsibility for developing work-based learning opportunities for students and monitoring student involvement in these activities. In some cases, this role is filled by Career Academy teachers who also have classroom responsibilities (although, usually, with a reduced course load). In other cases, the role is filled by non-teaching administrators whose primary responsibilities focus on one or more Academies.

B. Supports and Learning Opportunities

The basic organizational elements of the Career Academy approach have particular appeal because they offer direct responses to several common structural problems that have been identified in high schools, particularly schools serving low-income communities and students

placed at risk of school failure.[13] These core elements should be viewed as institutional mechanisms that are mutually reinforcing and, together, are intended to facilitate enhancements of interpersonal supports and enriched teaching and learning opportunities.

The second column of Figure 1.1 lists the types of supports and opportunities that are hypothesized to evolve from each of the three core organizational elements: (1) enhanced interpersonal support through the intensive interaction and collaboration offered by the school-within-a-school; (2) a focused curriculum and enriched teaching and learning experiences through the integration of academic and occupational content; and (3) exposure to career awareness and work-based education through the employer partnerships. These are discussed briefly below.

Interpersonal Supports. Career Academies aim to function as "communities of support" for students and teachers. For students, such support includes the personalized attention they get from their teachers, their teachers' expectations of them, their classmates' level of engagement in school, and the opportunities they have to collaborate with their peers on school projects. Academy teachers in this study indicated that they were supported by, among other things, opportunities for professional collaboration and development, adequate resources, the capacity to influence instructional and administrative decisions, and opportunities to give personalized attention to students. Both this study and previous research have identified these dimensions of support as factors that can have important effects on both students' motivation and engagement in school and teachers' job satisfaction and sense of having an impact on students' lives.

Focused Curricula and Enriched Learning Opportunities. Key goals of the Career Academy curricula are to ensure that students meet the core academic requirements they need to graduate and prepare for college and to focus students' non-Academy course-taking on a coherent set of vocational or occupation-related classes. In addition, curricula attempt to provide students with applied learning opportunities, including developing problem-solving skills, using computers or manipulative materials, working on long-term projects, and connecting what they learn to other subjects or the world of work. These types of activities have been identified as strategies for breaking down the dichotomy between academic and vocational curricula, or between abstract and applied learning. Such a dichotomy is often seen as a structural feature of high schools that limits their capacity to help students make the transition from school to work or to post-secondary education. Previous research has suggested that the separation of curricular tracks has created a false and unnecessary dichotomy between academic rigor and real-world relevance.[14]

Career Awareness and Work-Based Learning Opportunities. In general, Career Academies aim to provide students with two types of work-related learning opportunities that are built on the employer partnerships. The first, referred to as *career awareness and development activities*, are intended to enhance students' understanding of the world of work in general as well as their awareness of occupations within the program's broad career theme. Some of these activities occur outside school. They include field trips designed to expose students to various work environments and to provide opportunities to observe a regular workday. Another example is job-shadowing, which gives students the opportunity to accompany an adult on her or his job for a day or more. Some Career Academies develop mentoring programs to help students make connections with caring adults who can provide personal support and ca-

[13]See Kemple and Rock, 1996; Kemple, 1997a.

[14]Berryman, 1991; Raizen, 1989; Resnick, 1987; Dewey, 1916.

reer guidance. Other career awareness and development activities occur in school. These include formal and structured attempts to infuse Career Academy classes with discussions and activities focusing on careers or students' work-based learning experiences. They also include career counseling and the formal and informal discussions students have with their teachers and peers regarding preparation for work.

The second type of work-related learning opportunities are typically referred to as *work-based learning*, which has been defined as "work experiences that are planned to contribute to the intellectual and career development of students."[15] Work-based learning activities are probably the most intensive and distinctive work-related aspect of the Career Academy approach. Students are typically placed in jobs that have been developed in collaboration with the employer partners and are connected to school. Students have the opportunity to learn both job-specific skills and more general work habits and behaviors.

C. High School Outcomes

The supports and opportunities listed in the second column of Figure 1.1 are also mutually reinforcing and, together, are intended to affect students' engagement, performance, and development during their high school years The third column of the figure summarizes several key student outcomes that Career Academies are intended to improve. These include preventing students from dropping out of high school, helping them meet graduation requirements, enhancing their achievement, helping them meet college entrance requirements, providing necessary steps to apply for and be accepted into college or a job, promoting constructive use of non-school hours, and reducing risk-taking behaviors.

As noted earlier, this report focuses on the extent to which the Career Academies change these and other outcomes during students' high school years. Analyses presented later in the report will explore how particular organizational features of the Academies — or the types of supports or learning opportunities that develop from them — may or may not help account for the program impacts or lack of impacts.

D. Post-Secondary Outcomes

As shown in Figure 1.1, graduating from high school and acquiring various credentials should be viewed as transitional outcomes — as indications of students' level of preparedness for future education and work after high school. Ultimately, as indicated in the fourth column of the figure, the Career Academies are intended to lead to higher levels of post-secondary education and to higher-skilled and higher-paying careers.

Future reports from the Career Academies Evaluation will examine the impact Academies may have on these types of outcomes and will explore the connections between high school experiences and the impacts that may accrue after high school.

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[15]Office of Technology Assessment, 1995, p. 13.

IV. Key Features of the Career Academies Evaluation

In 1993, MDRC began development work for a unique study of the Career Academy approach. Its primary purpose has been to provide reliable evidence about the efficacy of the theories and hypotheses embedded in the conceptual framework illustrated in Figure 1.1. The evaluation responds to the growing demand for rigorous evidence about the effectiveness of school-to-work and other high school reform initiatives. This section of the chapter describes the key features of the evaluation design that are central to understanding the findings presented in this report.

A. The Random Assignment Design

The Career Academies Evaluation is a rarity in the field of education research in that it has been built on a random assignment research design and demonstrates the feasibility of implementing such a design within an ongoing high school program. In order to assess the difference that Career Academies make in the lives of high school students, the research design involves a comparison between students who applied for and were randomly selected to enroll in a Career Academy and students who also applied but were not selected. During the evaluation period, a random selection process, or lottery, was used to make the final selection of students for the Academies. This was possible because each Academy had more qualified applicants than it was able to serve and the sites were willing to implement the protocols called for in the random selection process.[16]

This report focuses on a sample of 1,764 students from nine of the sites selected for the study.[17] For the purposes of this report, this group of students is referred to as the *study sample*. Of the students in the study sample, 959 (54 percent) were randomly selected to enroll in an Academy. For the purposes of this report, these students are referred to as the *Academy group*. The remaining 805 students (46 percent of the study sample) were not invited to participate in the Academies but could choose other options available in the high school or school district. These students constitute the study's control group and are referred to in this report as the *non-Academy group*. In most cases, non-Academy group students enrolled in the general programs in the participating high schools, but in some cases they enrolled in citywide magnet programs or schools.

Figure 1.2 illustrates the random assignment research design and shows the comparison being made to determine the impact Career Academies have on high school outcomes. The boxes on the lower right side of Figure 1.2 correspond to the first three columns of Figure 1.1. The first box represents the distinctive organizational features of the Academies, and the second box represents the resulting supports and learning opportunities that derive from those features. The third box indicates the high school outcomes achieved by students randomly selected for the Academy group. Each of these boxes has a counterpart on the left side of Figure 1.2 for students randomly selected for the non-Academy group. The differences in outcomes between the two groups of students represent impacts of the Career Academies.

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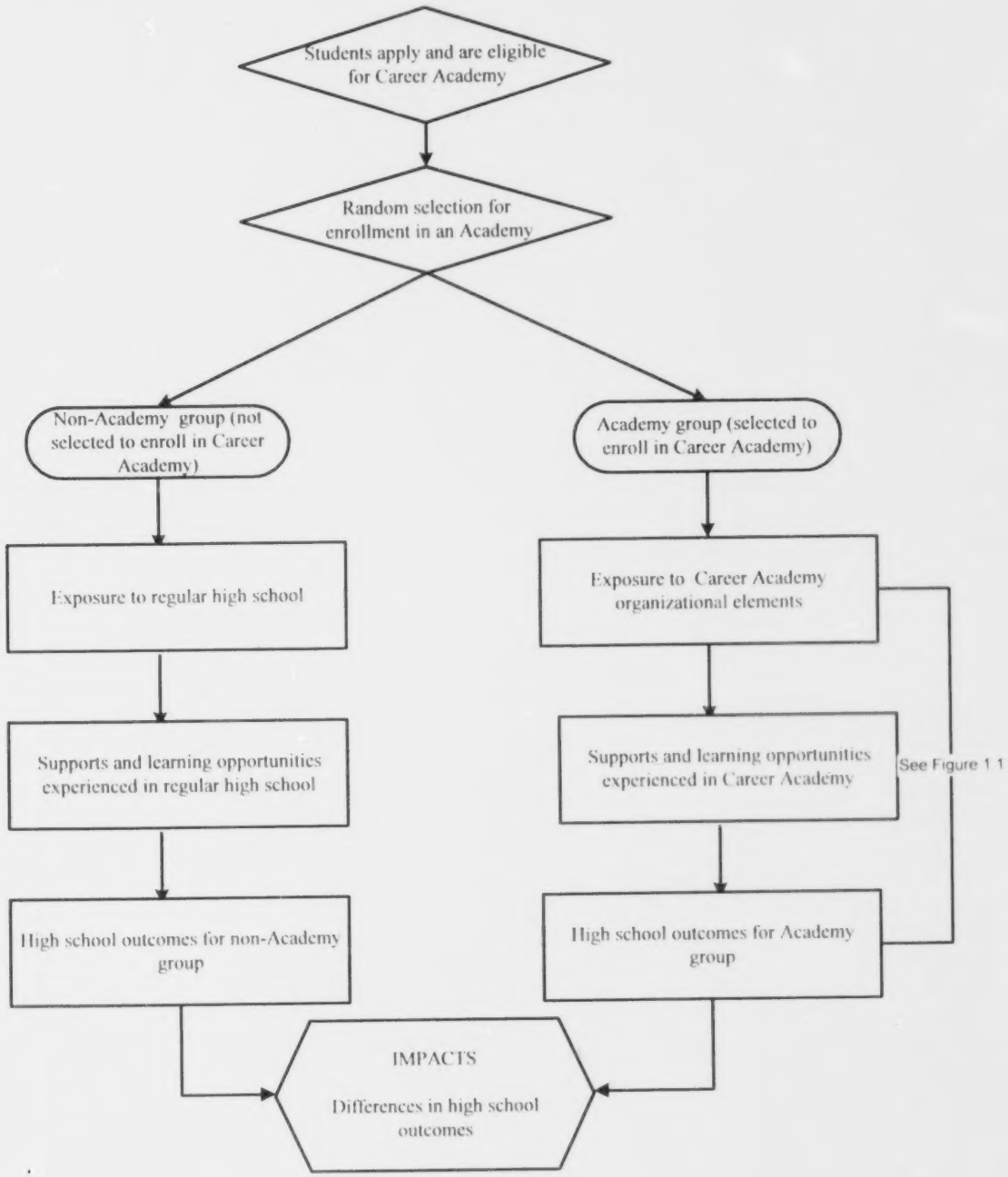
[16]See Chapter 4 in Kemple and Rock, 1996, for a more detailed description of how the random assignment procedure was implemented for this study.

[17]One of the 10 initial Career Academies was disbanded after two years in the study and was unable to provide sufficient follow-up data for its students in the study sample.

Figure 1.2

Career Academies Evaluation

Random Assignment Design


Students apply and are eligible for Career Academy
Random selection for enrollment in an Academy
Non-Academy group (not selected to enroll in Career Academy)
Academy group (selected to enroll in Career Academy)
Exposure to regular high school
Exposure to Career Academy organizational elements
Supports and learning opportunities experienced in regular high school
Supports and learning opportunities experienced in Career Academy
See Figure 1.1
High school outcomes for non-Academy group
High school outcomes for Academy group
IMPACTS
Differences in high school outcomes

The random selection process ensured that the two groups of students were virtually the same on average in terms of their background characteristics, prior school experiences, and initial motivation and attitudes toward school. Any systematic differences in the outcomes that subsequently emerged between the groups resulted from differences in their access and exposure to the Career Academies.[18] Differences in these school environments should have produced differences in the types of supports and learning opportunities experienced by students in the Academy and non-Academy groups. In fact, the previous reports and papers from the evaluation provide extensive evidence that Academy students experienced significant enhancements in the supports and learning opportunities illustrated in Figure 1.1, compared with their non-Academy counterparts. Academy students were also more likely to participate in a broad range of career awareness and work-based learning activities. Finally, Academy students were also somewhat more likely than their non-Academy counterparts to be exposed to various enriched learning activities in the classroom, such as applied learning and work-related problem-solving activities. The current report addresses the question of whether the Academies produced impacts on high school outcomes as represented by the three boxes at the bottom of Figure 1.2.

B. Sites in the Career Academy Evaluation

A second critical feature of the Career Academies Evaluation research design involves the selection of sites for participation in the study. MDRC was primarily interested in selecting sites that had already implemented versions of the organizational elements listed in the first column of Figure 1.1.[19] This was important because a key goal of the evaluation was to include functioning Academies that encompassed the central elements of the approach, rather than programs that were in the initial stages of implementation.

In addition, MDRC sought high schools in which there was a clear contrast between the Career Academy and other programs available to potential Academy students. This was important because one of the primary concerns of the study was whether Career Academies improve students' post-secondary education and employment outcomes above and beyond what would have occurred had they not had the opportunity to attend an Academy. Some high schools and school districts operate more than one Career Academy or other Academy-like programs. In such circumstances, many students in both groups would likely be involved in similar programs. This would reduce the contrast between their experiences and could mistakenly obscure the real effects of the Academies and make it appear that the Academies were ineffective.

Each participating site had established the basic Career Academy components described in this chapter: a school-within-a-school organization, academic and vocational curricula based on a career theme, and employer partnerships. This combination of features was not available elsewhere in the participating high schools.[20] Each Career Academy attempted to serve a wide

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[18]As discussed in Chapter 2, not all students randomly selected for the Academy group actually enrolled and remained in an Academy, and a small percentage of students selected for the non-Academy group did enroll.

[19]The site selection process is described in greater detail in Kemple and Rock, 1996, which also includes a detailed description of the Career Academies in the sites.

[20]Although some participating high schools do operate other programs that they classify as Career Academies, information collected for this study indicated that most such programs do not include the basic components of the Academy approach described earlier. As a result, the participating Career Academy programs represent a clear contrast with other programs in the high schools.

range of students, including those with a history of poor school engagement and performance as well as those who were engaged in school at the time they applied for the programs.

The participating Academies offer a range of occupational themes: three are in the business and finance fields; three focus on high-technology areas such as electronics and aerospace technology; and there is one each in the fields of health occupations, public service, travel and tourism, and video technology. The participating programs were drawn from most of the major established networks of Career Academies across the country, with four from the California Partnership Academy network, two from the National Academy Foundation network, one from the Florida network of Academies for Career Development and Applied Technology, and one from the network of Academy programs created by the District of Columbia Public Schools. Two of the participating Academies were developed independently through local high school or district initiatives.

As of the 1994-95 school year (when the last sites joined the study), the participating Career Academies had been in operation for as few as two years and as many as 11 years. Nine of the 10 Career Academies remained in operation throughout the evaluation period and were able to meet the data and other research-related needs of the evaluation. One site was disbanded after the 1995-96 school year and was unable to meet the data needs of the evaluation.

In summary, the sites participating in the Career Academies Evaluation provide a solid foundation on which to build a credible assessment of the implementation and impact of the Career Academy approach. Three important cautions should be kept in mind, however, in interpreting the findings from this study and, in particular, the findings presented in this report.

First, because the participating sites were chosen strategically, rather than randomly, the findings from this study cannot necessarily be generalized to all schools and school districts. These are school districts and high schools that were willing and able to commit the financial and personnel resources needed to implement and sustain a Career Academy. At the same time, however, these sites, as a group, share the characteristics of typical urban and small-city school districts, and, individually, they reflect much of the diversity of such districts. This provides some basis for extending the findings and lessons from this study beyond the participating schools.

Second, like their host high schools and school districts, the participating Career Academies are dynamic and evolving. Over the course of the evaluation, they have had to confront staff turnover, increases or decreases in funding, changes in local or state education policy, shifting levels of support from building or district staff, and changes in the amount and types of support they receive from employer partners. Because this is a longitudinal study, it has been able to provide a realistic picture of how ongoing programs evolve and change in the context of dynamic high schools. In general, most of the programs modified various components of the Career Academy approach in response to changing conditions in their host high schools or school districts, and many of them evolved toward more complete versions of the model. It should be noted, however, that some of the programs were weakened by staff turnover, funding reductions, or decreased support from school staff or employer partners. As noted earlier, one Academy was disbanded at the end of the 1995-96 school year. Although this site provides some useful lessons about institutional stresses that are likely to affect the sustainability of Career Academies, its dissolution and lack of comparable data prevent it from providing information to assess its impact on student outcomes.

Third, the previous reports from MDRC's Career Academies Evaluation focused primarily on findings that were aggregated across all participating sites. Although such findings shed light on the implementation and impact of the Career Academy approach more generally, they mask the high degree of variation among the sites and the ways this variation may be associated with differences in program effectiveness. For example, some sites were able to develop a particularly cohesive school-within-a-school, while others made strong investments in their employer partnerships. More important, the Academies in some sites represented an especially dramatic contrast with the regular school environment in terms of the degree of interpersonal and instructional support they offered students. A central focus of this report, therefore, is on determining whether some versions or contexts for the Academy approach are more effective than others.

C. Data Used in This Report

The conceptual framework described above has helped guide data-collection activities for the evaluation. For example, MDRC researchers conducted a variety of field research activities to document and describe the organizational features illustrated in the first column of Figure 1.1. Several surveys were developed and administered to students and teachers to gain systematic information about various supports and learning opportunities that might be captured by the second column. MDRC has also collected data from school records and students' transcripts to obtain information about their progress and performance in high school. As part of the evaluation, MDRC administered standardized math and reading tests to a subsample of students, and it conducted a survey at the end of students' 12th-grade year to learn about their use of non-school hours and preparation and plans for the future. Finally, as the evaluation moves forward, MDRC will continue to follow students beyond their high school years to collect information about their progress in post-secondary education and the labor market.

The primary data for this report were obtained from three sources: school transcript records, a survey that students in the study sample completed at the end of their 12th-grade year, and a standardized math computation and reading comprehension test administered to a subsample of the students at the end of their 12th-grade year. These are described briefly below.[21]

School Transcript Records. A complete set of school transcript records is available for 1,454 students in the study sample.[22] This is referred to in the report as the Student School Records Database. The Student School Records Database includes information about students' daily attendance rates, credits earned toward graduation, and course-taking patterns. Of the students in the Student School Records Database sample, 1,293 remained enrolled in high school through

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[21]See Appendix A for a more detailed discussion of the response rates and analytical issues associated with the data-collection efforts for the evaluation.

[22]MDRC attempted to collect school transcript records for all students in the study sample even if they had transferred to other high schools within the districts in which the participating Career Academies were located. MDRC was not able to obtain school transcript records for students who transferred to high schools outside these districts. Analyses of differences in data availability among students in the study sample indicated that there were no systematic differences in school records availability between Academy and non-Academy group students. MDRC obtained school records data for 82 percent of students in the Academy group and for 84 percent of students in the non-Academy group. Among students in the Student School Records sample, there were no systematic differences in the background characteristics of Academy and non-Academy group students. These analyses provide greater confidence that the Student School Records Database will yield valid estimates of Career Academy impacts.

the end of their 12th-grade year. The remaining 161 students (12 percent) were confirmed to have dropped out of high school before the end of their 12th-grade year. A complete set of school transcript records was obtained for these students up to the point at which they dropped out.

12th Grade Survey. The 12th Grade Survey was completed by 1,510 students in the study sample at the end of their 12th-grade year.[23] This is referred to as the 12th Grade Survey Database. The 12th Grade Survey asked students a wide range of questions about their school experiences, employment and work-related experiences, extracurricular activities, preparation for college and post-secondary jobs, and plans for the future.

Achievement Test Scores. Math computation and reading comprehension achievement tests were administered to 490 students in the study sample.[24] This is referred to as the 12th Grade Achievement Test Database. This test was initially designed by the Educational Testing Service (ETS) for the National Educational Longitudinal Surveys of 1988 (NELS: 88) follow-up and was administered to a nationally representative sample of students in their 12th-grade year. ETS permitted MDRC to administer the test to a subsample of students in the Career Academies Evaluation sample.[25] The Achievement Test Database provides national percentile scores both in reading comprehension and in math computation and problem-solving. It also provides criterion-referenced scores that indicate whether students demonstrated proficiency at particular skill levels of math and reading.

V. Overview of This Report

A central theme that has emerged from this evaluation is that an accurate and useful assessment of the effectiveness of the Career Academy approach must recognize that the program is not a "one-size-fits-all" initiative and that it produces different impacts for different

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[23]MDRC attempted to survey all students in the study sample even if they had transferred to high schools outside the participating districts or had dropped out of high school altogether. Analyses of differences in data availability among students in the study sample indicated that there were no systematic differences in 12th Grade Survey response rates between Academy and non-Academy group students. MDRC obtained completed surveys from 86 percent of students in the Academy group and from 85 percent of students in the non-Academy group. Among students in the 12th Grade Survey sample, there were no systematic differences in the background characteristics of Academy and non-Academy group students. These analyses provide greater confidence that the 12th Grade Survey Database will yield valid estimates of Career Academy impacts.

[24]MDRC attempted to administer the achievement test to the 691 students in the study sample who were scheduled to be in 12th grade at the end of the 1997-98 school year. The 490 students who completed the achievement test represents 71 percent of those attempted. Analyses of differences in data availability among students in the study sample indicated that there were no systematic differences in achievement test completion rates between Academy and non-Academy group students who were attempted. MDRC obtained completed achievement tests from 72 percent of the Academy group students attempted and from 70 percent of the non-Academy group students attempted. Among students in the Achievement Test sample, there were no systematic differences in the background characteristics of Academy and non-Academy group students. These analyses provide greater confidence that the Achievement Test Database will yield valid estimates of Career Academy impacts.

[25]The achievement test was administered to students on a Saturday morning near the end of their 12th- grade year. They were offered a stipend of $50 if they completed the test. Some concerns have been raised about whether this test instrument and the conditions under which it was administered provide an adequate indication of student achievement in math computation and reading comprehension. It should be noted, however, that the same test was administered under similar conditions as part of the U.S. Department of Education's National Educational Longitudinal Surveys of 1988 (NELS:88).

types of students. In order to highlight the importance of this theme, Chapter 2 describes the students who are in the study sample and identifies subgroups of students who are most likely to derive various benefits from the programs. All the key analyses and findings presented in this report are broken down by these subgroups. Chapter 2 also presents findings from an analysis of the patterns by which students in the study's Academy group enrolled and remained in the Career Academy programs.

Chapter 3 assesses the impact Career Academies have on students' high school engagement and performance and on their preparation for post-secondary education and employment. It focuses first on the impacts Career Academies produce for students who were at high risk of dropping out of high school. It then presents the results for students who entered the study highly engaged in school and were at very low risk of dropping out. Finally, it presents the impact findings for students who fell into a middle range of characteristics associated with a risk of school failure.

As noted earlier, this report also attempts to push much further in offering lessons about the efficacy of the Career Academy approach and other school reform initiatives that are embedded in it. The contrast among the sites and the differences in effectiveness for key subgroups of students provide a rich context for making judgments about what types of school reform initiatives are likely to be effective and for whom. Chapter 4 presents findings from an analysis that begins to highlight some of the key mechanisms by which the Academies may produce the impacts described in Chapter 3. This chapter identifies a group of sites, within the evaluation sample, in which the Career Academies represented a particularly dramatic contrast with their non-Academy school environments in terms of some of the key supports and learning opportunities described earlier. It also identifies a second group of sites that had very little contrast between the Academy and non-Academy school environments in these areas. Chapter 5 examines variation in impacts across these two groups of sites.

Chapter 2

Career Academy Students and Their Patterns of Enrollment in the Academy Programs

This chapter describes the background characteristics and prior school experiences of the students in the research sample for this report. It also summarizes findings on the patterns by which those selected for the Career Academies actually enrolled and remained in the programs. The chapter makes two key points.

First, the chapter highlights the fact that the students in the study sample come from diverse backgrounds and prior school experiences. This suggests that analyses that do not account for this diversity are likely to mask variation in the difference that Career Academies may make for some students and not for others. Section II of this chapter, therefore, identifies subgroups of students defined by background characteristics and prior school experiences associated with different patterns of school success or failure. The impact findings presented in Chapter 3 show that the Career Academies produced quite difference patterns of impacts for these three subgroups of students.

Second, the analyses presented in this chapter show that 88 percent of the students randomly selected for the study's Academy group (and invited to enroll in a Career Academy program) actually enrolled. By the end of 12th grade, 59 percent of the students initially selected for the programs were still enrolled in them. These enrollment and attrition patterns have implications for Career Academy policies and implementation practices. They also provide an important context for interpreting the impact findings presented later in the report.

I. Students in the Study Sample for This Report

This section of the chapter describes the background characteristics of the 1,764 students who constitute the study sample for this report. The description highlights the fact that no systematic differences were found in the background characteristics of the Academy group and the non-Academy group. This is the central purpose of the random selection process used in creating these two groups, and it extends to measured as well as unmeasured characteristics.

A. Background Characteristics of Students in the Study Sample

The Career Academies Evaluation has included efforts to collect information about 1,764 students who applied for one of nine Career Academies across the country between 1993 and 1996.[1] In this report these students are referred to as the *study sample*. Table 2.1 lists a variety of

[1]See Kemple and Rock, 1996, for a more detailed discussion of the procedures used to select students for the Career Academies Evaluation study sample. The initial sample for the Career Academies Evaluation consisted of 1,953 students from 10 sites. As noted earlier, one of the initial sites was disbanded and was not able to provide follow-up information needed for the analyses in this report. Thus, the 126 students in the initial study sample from that site are not included in the analyses. Also, MDRC found that information could not be obtained for 59 of the initial group of students because they should not have been included in the study sample. Four other students were found to be deceased.

Table 2.1

Career Academies Evaluation

Background Characteristics of Study Sample, by Research Status

Characteristic	Full Sample (%)	Academy Group (%)	Non-Academy Group (%)
Demographic and family characteristics			
Gender			
Male	43.8	44.6	42.9
Female	56.2	55.4	57.1
Age of student at time of application			
13 or younger	8.6	7.3	10.1
14	35.6	35.7	35.5
15	46.1	46.8	45.2
16 or older	9.7	10.1	9.2
Race/ethnicity			
Black	30.2	30.9	29.4
White	6.4	6.0	6.9
Hispanic	56.2	55.5	57.0
Asian or Native American	7.2	7.5	6.7
Student speaks limited English[a]	7.6	7.0	8.3
Student lives with			
Mother and father	61.7	61.1	62.5
Mother only	28.6	29.0	28.1
Father only	4.6	5.0	4.1
Other family/nonrelative	5.1	4.9	5.4
Student lives in single-parent household	38.3	38.9	37.5
Father's education level			
Did not finish high school	39.8	38.9	40.9
High school graduate	32.4	32.2	32.6
Completed some post-secondary	27.8	28.9	26.6
Mother's education level			
Did not finish high school	36.1	35.2	37.1
High school graduate	34.8	34.5	35.3
Completed some post-secondary	29.1	30.3	27.6
Neither parent has high school diploma	28.6	29.0	28.2
Parental Work			
Both parents work	47.3	46.5	48.3
Father works	23.8	23.5	24.1
Mother works	17.8	19.2	16.2
Neither parent works	11.1	10.8	11.4

(continued)

Table 2.1 (continued)

Characteristic	Full Sample (%)	Academy Group (%)	Non-Academy Group (%)
Family receives welfare or Food Stamps	24.2	23.6	25.0
Family mobility in past two years			
Have not moved	59.4	58.8	60.2
Moved 1 or 2 times	33.6	34.8	32.2
Moved 3 or more times	7.0	6.5	7.6
Student is home alone more than 3 hours per day	13.5	13.5	13.6
Educational characteristics			
8th-grade math test score[b]			
75th percentile or higher	8.5	8.8	8.1
50th to 74th percentile	20.4	21.0	19.7
25th to 49th percentile	32.2	29.9	35.0
24th percentile or lower	38.9	40.3	37.2
8th-grade reading test score[c]			
75th percentile or higher	9.8	10.4	9.0
50th to 74th percentile	19.4	20.8	17.7
25th to 49th percentile	36.3	33.7	39.4
24th percentile or lower	34.6	35.1	33.9
Student does not feel safe at school	23.2	22.7	23.9
Frequency of cutting classes			
Never	78.9	79.5	78.3
At least 1 time a week	19.7	19.4	20.1
Daily	1.4	1.2	1.6
Sent to office for misbehavior			
Never	81.3	81.0	81.6
1-2 times	15.7	16.2	15.2
3-10 times	3.0	2.8	3.2
Hours per week spent on homework			
1 hour or less	28.8	27.9	30.0
2-3 hours	38.2	39.3	36.9
4-6 hours	17.4	18.5	16.0
7 hours or more	15.6	14.3	17.2
Hours per day spent watching TV			
Less than an hour	12.3	11.7	13.0
1-2 hours	27.1	27.4	26.7
2-3 hours	26.8	24.9	29.1
Over 3 hours	33.8	36.0	31.3
Student has worked for pay	36.3	35.8	36.9

(continued)

Table 2.1 (continued)

Characteristic	Full Sample (%)	Academy Group (%)	Non-Academy Group (%)
Characteristics associated with dropping out of school			
Attendance rate, year prior to random assignment			
96-100%	54.2	53.1	55.4
91-95%	24.1	23.3	24.9
86-90%	11.0	12.2	9.5
85% or lower	10.8	11.4	10.2
Credits earned in 9th grade[d]			
5 or more credits	80.9	80.4	81.4
3-4 credits	13.7	14.3	12.9
2 or fewer credits	5.5	5.3	5.7
Grade point average in year of random assignment[e]			
3.1 or higher	36.2	34.4	38.3
2.1-3.0	38.1	39.5	36.5
2.0 or lower	25.7	26.1	25.2
Student is overage for grade level[f]	21.1	21.5	20.7
School mobility[g]			
0 or 1 different school	72.7	72.9	72.4
2 or more different schools	27.4	27.1	27.6
Student has sibling who dropped out of high school	20.2	19.8	20.6
Sample size	1,764	959	805

SOURCES: MDRC calculations from the Career Academies Evaluation Student Baseline Questionnaire Database and Student School Records Database.

NOTES: All characteristics were measured at the time students applied to the Career Academy program and prior to being randomly selected to the Academy and non-Academy groups.

Invalid or missing values are not included in individual variable distribution. Rounding may cause slight discrepancies in calculating of sums and differences.

A chi-square test was applied to differences in the distribution of characteristics across the Academy and non-Academy groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]These are students who responded that they spoke English "not well" or "not at all."

[b]Several different standardized, nationally normed math tests were administered to students, depending on the district where their school was located and the year they entered the study. National percentile scores were used because they were the only standardized scores available across tests.

[c]Several different standardized, nationally normed reading tests were administered to students, depending on the district where their school was located and the year they entered the study. National percentile scores were used because they were the only standardized scores available across tests.

[d]This was applicable only to students who applied to the Career Academy at the end of their 9th-grade year.

[e]Grade point averages were converted to a standard 4.0 scale from 100-point or 5-point scales for some sites.

[f]A student is defined as overage for grade at the time of random assignment if she or he turns 15 before the start of the 9th grade, or 16 before the start of the 10th grade. This indicates that the student was likely to have been held back in a previous grade.

[g]School mobility is defined as the number of schools attended since the 1st grade beyond the number expected to result from promotions in grade level or graduations.

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background characteristics and measures of prior school experiences for students in the study sample. The first column in the table lists the percentages of students in the full sample who had each of the characteristics listed.

The first section of Table 2.1 indicates that students in the study sample come from a wide range of family backgrounds. The vast majority of students identified themselves as either Hispanic (56 percent) or black (30 percent). The relatively large proportion of Hispanic students reflects the fact that several of the sites are located in predominantly Chicano and Latino communities in California, south Texas, and south Florida. The black students are concentrated in several large eastern cities.

The data collected for the evaluation does not include a direct measure of family income, but there are several indicators that the study sample includes a moderate proportion of students from low-income families. For example, Table 2.1 shows that 38 percent of the students lived in single-parent households at the time they applied for an Academy. Further, 11 percent of the students indicated that neither of their parents was working, and 24 percent indicated that their families were receiving welfare or Food Stamps. Twenty-nine percent reported that neither parent had received a high school diploma or a GED. Forty-one percent indicated that their families had moved at least once during the two years prior to applying for the Academy. The table also indicates that many students may come from middle-income families. Forty-seven percent of the students reported that both parents were working, and many students indicated that at least one of their parents completed some post-secondary education.

The second section of Table 2.1 lists a variety of indicators of students' prior school engagement and performance. The vast majority of students indicated that they did not have discipline problems in school and had high aspirations for their education. For example, approximately 80 percent reported that they had never skipped class during the second semester of 8th or 9th grade, and about the same percentage reported that they had never been sent to the school office for misbehavior. Also, although not shown in the table, virtually all the students reported that they expected to graduate from high school, and nearly two-thirds indicated that they expected to graduate from college.

At the same time, many students appeared to be struggling somewhat in school. Less than 10 percent of the students had 8th-grade math or reading test scores in the 75th percentile or higher, while 35 to 40 percent had test scores below the 25th percentile. Twenty percent of the students reported that they had cut class at least once per week during the second semester of 8th or 9th grade, and nearly 20 percent indicated that they had been sent to the school office for misbehavior. The table indicates an interesting comparison between the time students reported spending on homework and the time they spent watching television. One-third reported that they spent four or more hours per week doing homework (about one hour per weekday), and 61 percent that they spent two or more hours per day watching television.

The third section of Table 2.1 lists several demographic and school-related characteristics that have been found, both in prior research and in analyses conducted for this evaluation, to have particularly strong associations with later school engagement and performance. As discussed later in this chapter, these characteristics were used to create subgroups of students for the impact analyses. The respective subgroups include students with markedly different prospects for school success.

Many of the students appeared to be highly engaged in school. Over half the students in the study sample (54 percent) had attendance rates over 95 percent in the year they entered the study, and another 24 percent had attendance rates between 91 and 95 percent. Eighty-one percent of the students who applied to the Academies as 9th-graders had earned at least five credits in that year and would be considered to be on track toward graduation.[2] Over one-third of the students had a 3.1 grade point average or higher (approximately equivalent to a B average or higher) during the year they applied for an Academy.

A significant percentage of students in the study sample appeared to be disengaged from school. Eleven percent might be characterized as chronic absentees with attendance rates of less that 86 percent in the year they applied for the Academy programs. Nearly 20 percent of the students had already fallen behind in course credits, earning less than five in the 9th grade; 6 percent had fallen well behind, earning two or fewer course credits in the 9th grade. Approximately 21 percent of the students were overage for their grade level, indicating that they had been retained in a previous grade. About 27 percent of the students reported that they had transferred schools two or more times beyond the regular school transitions (such as from elementary to middle school or middle school to high school), indicating that their attachment to school may have been disrupted by family mobility or other reasons. Finally, about 20 percent of the students indicated that they had a sibling who had dropped out of high school.

B. Characteristics of Students in the Academy and Non-Academy Groups

As noted in Chapter 1, each of the students in the study sample applied for and was determined to be eligible for enrollment in one of the participating Career Academies. Because the programs had attracted more eligible students than they were able to serve, a lottery was used to select students for enrollment in the Academies. Of the students in the study sample, 959 (54 percent) were randomly selected to enroll in an Academy, and 805 (46 percent) were not selected for enrollment in an Academy but were eligible to enroll in other programs or classes in the host schools or school district.

The second and third columns of Table 2.1 provide a comparison between characteristics of students selected for the study's Academy group and those of students in the non-Academy group. The table indicates that there were no statistically significant differences between the background characteristics and prior school experiences of students in the two groups. This is a result of the random assignment design and can also be extended to characteristics that are not directly measured by the data collected for this evaluation. These include such constructs as initial motivation, attitudes toward school, and other baseline attributes that may be associated with school engagement and performance. In other words, the random assignment process created two groups for which there were no systematic differences initially, in both measured and unmeasured characteristics. As a result, one can be confident that any systematic differences that emerged after random selection can be attributed to the fact that the Academy group was selected to enroll in the programs and the non-Academy group was not. This chapter also includes a discussion of the rates at which students actually enrolled in the Academies and examines the extent

[2] It should be noted here that approximately 22 percent of the students were applying for the Academies as 8th-graders by virtue of the fact that the Academies began in 9th grade. These students were not included in calculations of credits earned in 9th grade.

to which students remained in the programs and, thus, were likely to be exposed to the full range of Academy experiences.

II. Subgroups of Students Defined by Characteristics Associated with Dropping Out of High School

Previous research on Career Academies has not typically examined the relative effectiveness of the approach among the different types of students the programs serve. Although findings from previous research have been useful, they do not recognize the fact that Career Academies may change certain outcomes for some students but not necessarily for others. The random assignment research design used in this evaluation provides a unique opportunity to assess the potential for the Academies to make a difference for various groups of students. As noted above, engagement and performance of students in the study's non-Academy group provide the best indication of how students in the Academy group were likely to behave if they did not have the opportunity to enroll in an Academy.

In particular, many students in the study's non-Academy group were unlikely to drop out of high school, making it unlikely that the Academies could reduce dropout rates or increase basic school engagement much further for them. An important question about these students, however, is whether the Academies expanded (or at least did not limit) their opportunities to pursue a more rigorous curriculum or increased their preparation for post-secondary education and employment. By contrast, other students in the non-Academy group (for example, those who had failed several courses in 9th grade) were at relatively high risk of school failure and could be seen as having the potential to benefit from involvement in the Academies in a variety of ways, including being prevented from dropping out.

Given the dramatic differences in outcomes for various subgroups of students within the non-Academy group, the primary focus of this report is on the impact Career Academies have for students at greater or lesser risk of dropping out of high school or of doing poorly, if they remain in high school. To assess this variation in impacts, students in the study sample were divided into three subgroups based on selected background characteristics and prior school experiences that were associated with dropping out of high school. This section of the chapter provides an overview of the strategy used to identify these subgroups and highlights the basic distinctions among them.

Student subgroups were defined using six characteristics found to be strong predictors of dropping out among students in the study's non-Academy group. These characteristics were all measured at the time students applied for a Career Academy and before they were randomly selected for the Academy or non-Academy group. Each of these characteristics has also been identified in prior research as being highly correlated with dropping out of high school.[1] They include:

- average daily attendance in the year the student applied for an Academy;
- grade point average for the year the student applied for an Academy;

[1]For a review of research literature on background characteristics, measures of prior school performance, and other factors associated with dropping out of school, see Natriello, 1987, and Roderick, 1993.

- the number of credits earned toward graduation in 9th grade (for students applying for an Academy at the end of 9th grade);
- whether the student was overage for grade (indicating the student had been retained in a prior grade);
- whether the student had a sibling who dropped out of high school; and
- whether the student had transferred schools two or more times beyond the typical school transitions.

In other random assignment studies, subgroups have been determined by identifying sample members using one or more characteristics associated with a difference in the way they are likely to be treated by the program under study or in the outcomes they are likely to achieve without having access to the program.[4] In education research, subgroups have been created by distinguishing between students who have, for example, two or more characteristics associated with school failure and those who have only one such characteristic or none.[5] Such methods might be called "risk-factor accumulation" strategies because they involve simply adding up particular indicators and defining the subgroups based on the number of risk-related characteristics a given student has.

Risk-factor accumulation strategies, however, have some limitations. In particular, they give equal weight to each of the selected risk-related background characteristics and prior school experiences. As a result, they do not account for the fact that some characteristics are more highly associated with school failure than others. In addition, this strategy does not account for the fact that some students also have a number of related characteristics that are associated with school success and that may offset the risk associated with other characteristics. For example, some students may have failed several courses in 9th grade even though they attended regularly and did not have other background characteristics associated with dropping out. As a result, various combinations of characteristics, along with different degrees of importance attached to some characteristics, may indicate a different degree of risk.

Given these limitations, a more systematic approach was used for this report, in order to identify groups of students who were clearly distinct in terms of their likelihood of dropping out in the absence of access to a Career Academy.[6] In particular, the background characteristics and prior school experiences listed above were used to predict the probability that students in the non-Academy group would drop out of high school. This provided an estimate of the unique contribution that each characteristic made to predicting that these students would drop out. For example, attendance rates and credits earned toward graduation were found to be better predictors of dropping out than students' being overage for grade. Also, the prediction model provided the opportunity to give more weight to different specifications of a characteristic. For example, the lower a student's prior attendance rate, the more likely that he or she would drop out. Thus, students with very low attendance rates might be considered at high risk of dropping out, even

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[4]See, for example, Friedlander, 1988.

[5]See, for example, NCES, 1990 and NCES, 1992.

[6]Appendix B provides a more detailed and technical discussion of the subgroup identification strategy used for this report, including some potential limitations of this approach.

though they had not been held back in a previous grade and did not have a sibling who dropped out of school.

Because of the random assignment research design, this approach, based on these characteristics, best predicts which students in the Academy group would have dropped out in absence of access to an Academy. Thus, students in the Academy group were sorted using the same average background characteristics that were used to predict dropping out for the non-Academy group. Following are brief definitions of the three risk subgroups, which are described further below.

- **High-risk subgroup:** students in the study sample (approximately 25 percent of both the Academy and the non-Academy groups) with the combination of characteristics associated with the highest likelihood of dropping out
- **Low-risk subgroup:** students in the study sample (approximately 25 percent of both the Academy and the non-Academy groups) with the combination of characteristics associated with the lowest likelihood of dropping out
- **Medium-risk subgroup:** the remaining students in the study sample (approximately 50 percent of both the Academy and the non-Academy groups) with a mix of characteristics indicating that they were not particularly likely to drop out but were not necessarily highly engaged in school

A. Characteristics of Students in the Risk Subgroups

Table 2.2 presents selected characteristics of students in the three risk subgroups, including the background characteristics and prior school experiences used to define the subgroups. Because each of the characteristics used to define the subgroups was measured before students were randomly assigned to the two main study groups, there are no systematic differences in observed background characteristics between Academy and non-Academy groups within each of the three risk subgroups.[7]

Students in the High-Risk Subgroup. The third section of Table 2.2 lists the six characteristics that were used to define the risk subgroups. It shows, for example, that 43 percent students in the high-risk subgroup had a sibling who dropped out of high school and that 43 percent were overage for their grade level (indicating they had been held back in a prior grade). About one-third of these students could be classified as chronic absentees (having an attendance rate of 85 percent or lower in the year they applied to an Academy), and 62 percent had a grade point average of 2.0 or lower (out of a possible 4.0). Also, over half of the students in the high-risk

[7]The initial prediction of dropping out was based on analyses using the non-Academy group. An index of average characteristics of likely dropouts from the non-Academy group was then applied to the Academy group. Given the statistical properties of the analyses used, random differences in characteristics between the Academy and the non-Academy groups are likely to yield somewhat more accurate predictions of likely dropouts for the non-Academy group. This means that, in the high-risk subgroups, the dropout rate for non-Academy students may be artificially higher than the dropout rate for Academy students. Extensive analyses were conducted to identify the potential magnitude of this distortion. These analyses indicate that whatever distortion exists is negligible and did not change the pattern of impacts. This issue is discussed in greater detail in Appendix B.

Table 2.2

Career Academies Evaluation

Background Characteristics of Study Sample, by Subgroups Defined by Risk of Dropping Out of School

Characteristic	High-Risk Subgroup (%)	Medium-Risk Subgroup (%)	Low-Risk Subgroup (%)	
Demographic and family characteristics				
Gender				
Male	43.0	45.5	41.3	
Female	57.0	54.6	58.7	
Age of student at time of application				
13 or younger	2.1	10.6	11.7	***
14	22.2	39.2	43.6	
15	54.4	42.8	43.3	
16 or older	21.3	7.4	1.4	
Race/ethnicity				
Black	37.6	29.9	22.7	***
White	4.7	7.2	6.8	
Hispanic	51.8	56.0	61.5	
Asian or Native American	5.9	6.9	9.2	
Student speaks limited English[a]	8.7	7.7	6.2	
Student lives in single-parent household	49.7	39.2	23.8	***
Neither parent has high school diploma	26.6	29.5	28.8	
Parental Work				
Both parents work	41.3	48.3	51.9	***
Father works	24.9	20.6	29.0	
Mother works	19.4	19.8	12.1	
Neither parent works	14.3	11.3	7.1	
Family receives welfare or Food Stamps	31.8	23.0	18.6	***
Family mobility in past two years				
Have not moved	54.2	60.5	63.3	***
Moved 1 or 2 times	33.5	34.6	31.7	
Moved 3 or more times	12.4	5.0	5.0	
Educational characteristics				
8th-grade math test score[b]				
75th percentile or higher	3.1	8.8	14.0	***
50th to 74th percentile	16.3	20.5	24.8	
25th to 49th percentile	31.0	33.9	29.9	
24th percentile or lower	49.5	36.8	31.3	

(continued)

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Table 2.2 (continued)

Characteristic	High-Risk Subgroup (%)	Medium-Risk Subgroup (%)	Low-Risk Subgroup (%)	
8th-grade reading test score[c]				
75th percentile or higher	4.1	10.6	14.6	***
50th to 74th percentile	19.7	19.5	18.9	
25th to 49th percentile	36.3	37.6	33.5	
24th percentile or lower	40.0	32.3	33.1	
Student does not feel safe at school	27.0	22.5	20.6	*
Frequency of cutting classes				
Never	63.4	82.2	89.7	***
At least 1 time a week	33.2	16.9	10.3	
Daily	3.4	0.9	0.0	
Sent to office for misbehavior				
Never	73.6	81.0	90.4	***
1-2 times	20.7	16.4	8.7	
3-10 times	5.7	2.5	1.0	
Characteristics associated with dropping out of school				
Attendance rate, year prior to random assignment				
96-100%	24.4	52.5	91.0	***
91-95%	23.6	32.3	7.9	
86-90%	18.7	11.7	1.0	
85% or lower	33.3	3.6	0.2	
Credits earned in 9th grade[d]				
5 or more credits	47.2	93.8	100.0	***
3-4 credits	35.1	6.3	0.0	
2 or fewer credits	17.7	0.0	0.0	
Grade point average in year of random assignment[e]				
3.1 or higher	12.5	37.2	58.6	***
2.1-3.0	25.5	44.0	39.3	
2.0 or lower	62.0	18.7	2.1	
Student is overage for grade level[f]	43.0	18.2	2.4	***
School mobility[g]				
0 or 1 different school	50.0	71.9	99.0	***
2 or more different schools	50.0	28.1	1.0	
Student has sibling who dropped out of high school	42.7	17.5	0.5	***
Sample size (N=1,764)	474	869	421	

(continued)

Table 2.2 (continued)

SOURCES: See Table 2.1.

NOTES: All characteristics were measured at the time students applied to the Career Academy program and prior to being randomly selected to the Academy and non-Academy groups.

Invalid or missing values are not included in individual variable distribution. Rounding may cause slight discrepancies in calculating of sums and differences.

A chi-square test was applied to differences in the distribution of characteristics across the Academy and non-Academy groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]These are students who responded that they spoke English "not well" or "not at all."

[b]Several different standardized, nationally normed math tests were administered to students, depending on the district where their school was located and the year they entered the study. National percentile scores were used because they were the only standardized scores available across tests.

[c]Several different standardized, nationally normed reading tests were administered to students, depending on the district where their school was located and the year they entered the study. National percentile scores were used because they were the only standardized scores available across tests.

[d]This was applicable only to students who applied to the Career Academy at the end of their 9th-grade year.

[e]Grade point averages were converted to a standard 4.0 scale from 100-point or 5-point scales for some sites.

[f]A student is defined as overage for grade at the time of random assignment if she or he turns 15 before the start of the 9th grade, or 16 before the start of the 10th grade. This indicates that the student was likely to have been held back in a previous grade.

[g]School mobility is defined as the number of schools attended since the 1st grade beyond the number expected to result from promotions in grade level or graduations.

subgroup who applied for an Academy at the end of 9th grade had already fallen behind in the number of course credits they needed to graduate.

Table 2.2 also highlights a number of other distinctive characteristics of students in the high-risk subgroup. It shows that these students were the most likely to have 8th-grade math or reading test scores below the 25th percentile nationally. About half of them lived in single-parent households, and 32 percent reported that their families received public assistance.

Students in the Low-Risk Subgroup. The vast majority of students in the low-risk subgroup had attendance rates higher than 95 percent, and all of those who applied to an Academy at the end of 9th grade had earned at least five credits toward graduation. Over half had a grade point average of 3.1 or higher, and very few were overage for grade. Almost none of the low-risk students had a sibling who dropped out of high school, and very few had transferred schools other than at the typical school transition points. The majority of these students lived in households where at least one parent had a high school diploma or GED (over 70 percent), and over half lived in households where both parents worked.

Although students in the low-risk subgroup appeared to be highly engaged in school at the time they applied to an Academy, their standardized test scores indicate that they were not necessarily high-achieving students. Less than 15 percent of the low-risk subgroup had math or

reading test scores above the 75th percentile nationally, and almost a third scored in the bottom quartile.

Students in the Medium-Risk Subgroup. The students in the medium-risk subgroup reflect a mix of background characteristics and prior school experiences. Many of these students appeared to be highly engaged in school; the vast majority of those who applied for an Academy at the end of 9th grade had earned five or more course credits, and about half had attendance rates of higher than 95 percent. At the same time, just under 20 percent were overage for their grade level, and just under 20 percent had a grade point average of 2.0 or lower.

B. Selected Outcomes by Risk Subgroup for the Non-Academy Group

Figure 2.1 shows three outcomes that are central to the analyses conducted for this report: the dropout rate, the percentage of students who completed sufficient course credits to meet their districts' graduation requirements, and the percentage of students who completed a basic core academic curriculum (four course credits in English, three course credits in social studies, and two course credits each in science and math). Each outcome was measured at the end of the students' 12th-grade year. The figure illustrates the percentages of students in the non-Academy group from each of the three risk subgroups who attained each of these outcomes. It illustrates the dramatic differences among the three subgroups.

Thirty-two percent of non-Academy students in the high-risk subgroup dropped out of high school, and nearly three-quarters had not earned enough credits to graduate from high school by the end of their 12th-grade year. Only 16 percent of the non-Academy students in this subgroup had completed the basic core academic curriculum. The analysis in Chapter 3 assesses the extent to which students in the Academy group who had the same background characteristics fared better than their non-Academy counterparts.

Figure 2.1 also illustrates the relatively high level of engagement among non-Academy students in the low-risk subgroup. In all, only 3 percent of these students in the non-Academy group dropped out of high school, and 75 percent had earned enough credits to meet their districts' graduation requirements. Just over 60 percent had completed the basic core curriculum. The analysis in Chapter 3 assesses the extent to which the Career Academies enhanced or limited the capacity of these students to complete their course requirements for graduation and to prepare for post-secondary education.

As expected, the outcome levels for non-Academy students in the medium-risk subgroup fell between those in the high- and low-risk subgroups. Eight percent of non-Academy students in the medium-risk subgroup dropped out of high school, while 65 percent earned sufficient credits to meet district graduation requirements. About half of these students completed the basic core curriculum.

III. Career Academy Enrollment and Attrition Patterns

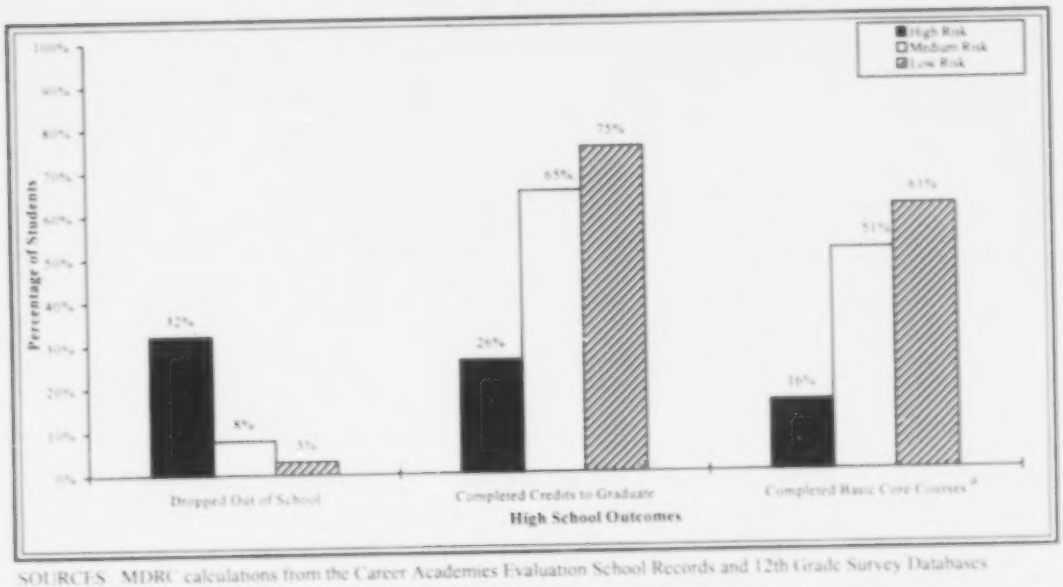
This section of the chapter examines the patterns by which students in the study sample enrolled and remained in the Career Academies. This information is important to the evaluation because the patterns of Academy enrollment and attrition are the key indicators of the extent to which students in the sample were exposed to the full range of Academy experiences. Thus, these

patterns are key determinants of program impacts and provide a crucial context for interpreting the results discussed later in the report. This information is also relevant to policies and practices affecting Career Academies because they shed light on the demand for the programs and assess their capacity to keep students engaged in their activities and services.

Figure 2.1

Career Academies Evaluation

12th Grade Outcomes Among Non-Academy Students, by Risk Subgroup



SOURCES: MDRC calculations from the Career Academies Evaluation School Records and 12th Grade Survey Databases.

NOTES: A two-tailed t-test was applied to differences between Academy and non-Academy groups. Statistical significance levels are indicated as *** = 1 percent, ** = 5 percent, * = 10 percent.

*Indicates completion of four English, three social studies, two math, and two science courses during high school.

The findings discussed in this section of the chapter are based on 782 students in the study sample who were randomly selected for the Academy group at the end of 8th or 9th grade.* The analysis follows these students through the end of their 12th-grade year to determine the percentage who actually enrolled in a Career Academy and then examines the patterns by which they left or remained in the programs. It also examines the reasons why some of these students chose not to enroll in a Career Academy or why they enrolled for a time and then left.

A. How Many Students Enrolled in a Career Academy and How Many Stayed in the Programs?

Figure 2.2 illustrates the enrollment patterns of a typical group of 100 students in the study sample selected to enroll in the Academy programs. The numbers in the boxes thus repre-

*This includes students in the Academy group from the Career Academies Evaluation Student School Records Database. The remaining Academy students in the study sample did not have a complete set of school records and, therefore, did not have a complete record of their school enrollment status.

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sent percentages of the 782 students in the Academy group who were randomly selected to enroll in programs. The figure shows that 88 percent of these students enrolled in a Career Academy at some point during high school; the vast majority did so during the year following their application to the programs (the first semester of 9th or 10th grade). Figure 2.2 also shows that 58 percent of the initial group of students were still enrolled in an Academy at the end of their 12th-grade year. This means that 66 percent of those who were enrolled in an Academy for at least one semester remained in the programs throughout high school.

Figure 2.2 also indicates that a significant portion of those initially selected for the programs were not exposed to the full range of Career Academy experiences. In all, 42 percent of the Academy group either did not enroll in the program or enrolled for a semester or more and then left. The next two sections provide an overview of what happened to these students and review some of the factors that led to their not enrolling or not remaining in the programs.

B. What Happened to the Students Who Never Enrolled in a Career Academy or Who Enrolled and Later Left the Programs?

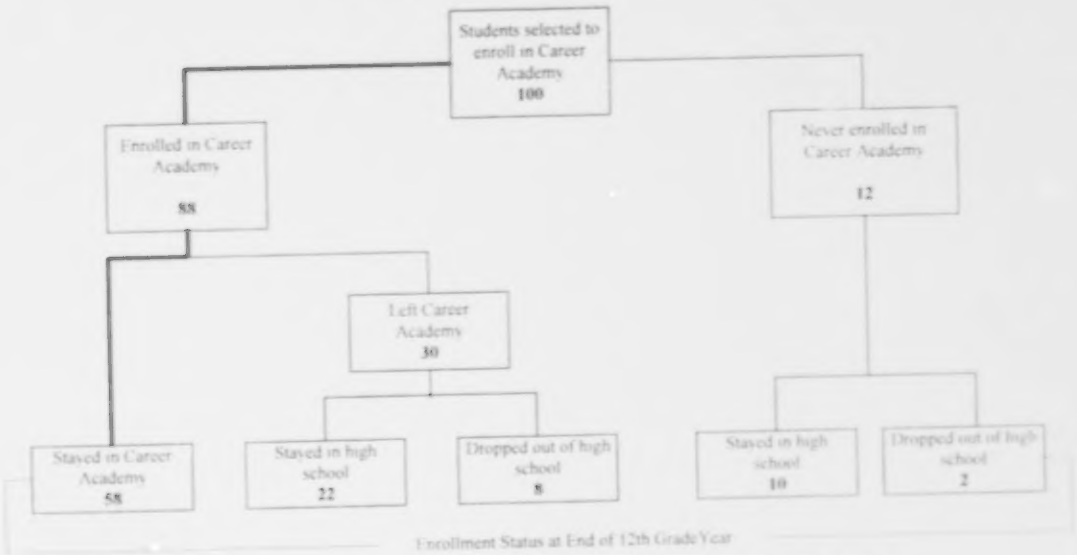
The following is a summary of the high school enrollment status of those students who either never enrolled in a Career Academy or enrolled and then left the programs before the end of high school.

- **12 percent of the students randomly selected for the Academy group never enrolled in a Career Academy.** Following is a summary of the high school enrollment status at the end of their 12th-grade year:
  - 4 percent were still enrolled in the high school in which the Academy was located (but were not enrolled in the Academy).
  - 5 percent were enrolled in another high school in the same district.
  - 1 percent were enrolled in a high school in another district.
  - 2 percent dropped out of high school.
- **30 percent of the students randomly selected for the Academy group enrolled in a Career Academy during at least one semester of high school, but they left the program before the second semester of their 12th-grade year.** Nearly 90 percent of these students had left a Career Academy by the end of their 11th-grade year. This begins an important stage of involvement in an Academy because most work-based learning activities occur during the summer between 11th and 12th grades or during the 12th-grade year. These students spent an average of three semesters in the program before they left. Following is a summary of their school enrollment status at the end of their 12th-grade year:
  - 12 percent were still enrolled in the high school in which the Academy was located (but were not enrolled in the Academy).
  - 9 percent were enrolled in another high school in the same district.
  - 1 percent were enrolled in a high school in another district.
  - 8 percent had dropped out of high school.

Figure 2.2

Career Academies Evaluation

Career Academy Enrollment and Attrition Patterns Among Students Selected to Enroll



SOURCE: MDRC calculations from the Career Academies Evaluation Student School Records Database.

NOTE: Numbers are derived in proportion to 782 students who were selected to enroll in Career Academies.

In sum, therefore, 90 percent of the students randomly selected for the Academy group were still enrolled in high school at the end of their 12th-grade year. Following is a summary of where they were enrolled in school:

- 58 percent were enrolled in a Career Academy.
- 16 percent were enrolled in the high school in which the Academy was located.
- 15 percent were enrolled in another high school in the same district.
- 1 percent were enrolled in a high school in another district.

Also, by the end of their 12th-grade year, approximately 10 percent of the students in the Academy group had dropped out of high school.

C. Why Did Students Not Enroll in a Career Academy or Enroll and Then Leave?

Of the students who applied for a Career Academy and were selected to enroll, 42 percent had either never enrolled in an Academy or had enrolled and then left before the second semester of their 12th-grade year. A subset of 251 completed the 12th Grade Survey and provided information about why they did not enroll in an Academy or why they enrolled and then left. Students were asked to rate up to 16 items in terms of how important each was as a reason for not enroll-

ing in an Academy or enrolling and then leaving. For the purposes of this analysis, the primary reasons for never enrolling, or for enrolling and then leaving, were divided into four mutually exclusive groups: student choice, family mobility and school transfer, being asked to leave, and dropping out.[9]

The following is a summary of the reasons that students listed as the most important factors that led them to never enroll in a Career Academy or to enroll for at least one semester and then leave before the end of their 12th-grade year.

- **Student choice.** 54 percent of the students reported one or more reasons, indicating that they chose not to enroll or chose to leave the Academy. Among those who chose to leave or not to enroll, the most common reasons included:[10]
  - I wanted to enroll in another program. (42 percent)
  - I was not really interested in the program to begin with. (39 percent)
  - I did not think the program would help me get into the college I wanted. (32 percent)
  - I did not like the teachers. (36 percent)
  - I lost interest in the occupational area. (35 percent)
- **Mobility.** 23 percent of the students reported that they moved and had to transfer to another high school.
- **Being asked to leave.** 16 percent reported that they were asked to leave the Academy.
- **Dropping out.** 5 percent reported that they stopped going to high school.
- **No primary reason.** 2 percent did not indicate a primary or secondary reason.

This suggests that most of the attrition from the Career Academies is the result of a decision on the part of students. However, nearly one-quarter of the attrition appears to be a function of family mobility and school transfers.

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[9] Students were asked to rate each reason on a 4-point scale: 1 = very important, 2 = sort of important, 3 = not very important, and 4 = not important at all. Items that were rated as "very important" were designated as primary reasons, and items rated as "sort of important" were designated as secondary reasons. If a student did not list a primary reason, then the secondary reason was designated as the primary reason.

[10] These are not mutually exclusive categories. Many students listed several reasons as being "very important" or "sort of important." In addition to the reasons listed, other reasons students chose to leave or not enroll in the Academies included: "The program was too hard"; "I wanted to be in classes with more of my friends"; "I was tired of being in classes with the same students"; "I did not think the program would help me get the job I wanted"; and "I chose to leave for other reasons."

D. Who Is Most Likely to Enroll and Remain in a Career Academy?

Table 2.3 presents the Career Academy enrollment and attrition rates for selected subgroups of students who were randomly selected for the Academy group. The table shows the percentage of each subgroup who had enrolled in an Academy at some point during high school and the percentage who remained enrolled in the programs through the end of 12th grade. The table also shows the percentage of each subgroup who enrolled during at least one semester of high school but who then left before the end of 12th grade. Finally, the last column of the table shows the average number of semesters that students in each subgroup were enrolled in an Academy.

In general, the table indicates that there were some modest differences among various subgroups in the percentage of students who had enrolled in an Academy during at least one semester during high school. Academy enrollment rates ranged from 80 to 95 percent for most of the subgroups. It is interesting to note that the initial Career Academy enrollment rates were quite similar among the three risk subgroups.

Table 2.3 does indicate somewhat more variation among the various subgroups in the percentage of students who remained in a Career Academy through the end of their 12th-grade year. In general, students in the high-risk subgroup were less likely than medium- and low-risk students to be enrolled in a Career Academy through the end of 12th grade. This can be seen in the last section of the table, which shows the enrollment rates for the risk subgroups. It shows that 43 percent of students in the high-risk subgroup were enrolled in an Academy at the end of 12th grade, indicating that about half of those who initially enrolled eventually left the programs. On average, these students spent just under four semesters in a Career Academy. For the majority of high-risk students, therefore, the benefits that may have derived from the Academies were likely to occur during 10th and 11th grades (or 9th and 10th grades in sites where the Academies began in 9th grade). Thus, many students in the high-risk subgroup did not stay in the programs long enough to participate in the work-based learning programs and work internships, which typically occur after 11th grade.

By contrast, 73 percent of the students in the low-risk subgroup were enrolled in a Career Academy at the end of 12th grade. This means that over 80 percent of these students who initially enrolled in a Career Academy remained enrolled in the programs throughout high school. On average, students in the low-risk subgroup spent over five semesters in a Career Academy.[11]

E. Implications for Career Academy Implementation and for the Career Academies Evaluation

The enrollment and attrition patterns discussed above have implications for policy and practice related to the Career Academies. They also provide an important context for interpreting the impact findings discussed in Chapter 3. These are discussed briefly below.

Implications for Career Academy Policies and Implementation. It is unclear how much of the attrition could theoretically be controlled or avoided by the Academies. Student mo-

[11]Note that for approximately 80 percent of the students in the sample, the Career Academies began in 10th grade. These students had the opportunity to remain enrolled in an Academy for up to six semesters. For the remaining students, the Career Academies began in 9th grade, providing students with the opportunity to enroll for up to eight semesters.

Table 2.3

Career Academies Evaluation

Career Academy Enrollment and Attrition Rates for Selected Subgroups of the Academy Group

Subgroups	Sample Size	Ever Enrolled in a Career Academy (%)	Enrolled through 12th Grade (%)	Enrolled in a Career Academy and Then Left (%)	Average Number of Semesters Enrolled in a Career Academy
All students randomly selected for Academy group	782	88.4	58.7	29.7	4.6
Demographic and family characteristics					
Male	345	88.4	55.4	33.0	4.4
Female	437	88.3	61.3	27.0	4.7
Age of student at time of application					
13 or younger	60	85.0	58.3	26.7	5.6
14	283	88.3	59.0	29.3	4.8
15	369	90.0	60.4	29.5	4.5
16 or older	69	82.6	47.8	34.8	3.7
Race/ethnicity					
Black	240	80.0	50.8	29.2	4.3
White	45	97.8	64.4	33.3	4.7
Hispanic	423	92.7	61.9	30.7	4.8
Asian or Native American	62	83.9	61.3	22.6	4.3
Student speaks limited English[a]	46	95.7	76.1	19.6	5.1
Student lives in single-parent household	285	82.8	50.9	31.9	4.2
Neither parent has high school diploma	194	94.8	66.0	28.9	4.9
Parental Work					
Both parents work	339	88.5	60.8	27.7	4.6
Father works	171	92.4	61.4	31.0	4.8
Mother works	139	87.8	59.0	28.8	4.7
Neither parent works	79	78.5	45.6	32.9	4.0

(continued)

Table 2.3 (continued)

Subgroups	Sample Size	Ever Enrolled in a Career Academy (%)	Enrolled through 12th Grade (%)	Enrolled in a Career Academy and Then Left (%)	Average Number of Semesters Enrolled in a Career Academy
Family receives welfare or Food Stamps	159	85.5	49.7	35.8	4.4
Family mobility in past two years					
Have not moved	498	87.1	54.2	32.9	4.5
Moved 1 or 2 times	231	92.2	67.1	25.1	4.9
Moved 3 or more times	43	79.1	58.1	20.9	4.3
Characteristics associated with dropping out of school					
Student has sibling who dropped out of high school	151	88.1	53.0	35.1	4.3
Attendance rate, year prior to random assignment					
96-100%	430	90.7	67.2	23.5	5.0
91-95%	185	86.5	54.6	31.9	4.5
86-90%	94	85.1	46.8	38.3	4.0
Less than 85%	70	82.9	32.9	50.0	3.2
Credits earned in 9th grade[b]					
5 or more credits	482	90.5	65.4	25.1	4.6
3-4 credits	76	88.2	39.5	48.7	3.6
2 or fewer credits	18	81.3	25.0	56.3	2.8
Grade point average in year of random assignment[c]					
3.1 or higher	253	85.0	63.2	21.7	5.2
2.1-3.0	282	91.5	61.7	29.8	4.5
2.0 or lower	172	87.8	46.5	41.3	3.8
Student is overage for grade level[d]	153	83.7	46.4	37.3	4.0
School mobility[e]					
0 or 1 different school	558	88.5	60.6	28.0	4.7
2 or more different schools	189	87.8	56.1	31.7	4.5

(continued)

Table 2.3 (continued)

Subgroups	Sample Size	Ever Enrolled in a Career Academy (%)	Enrolled through 12th Grade (%)	Enrolled in a Career Academy and Then Left (%)	Average Number of Semesters Enrolled in a Career Academy
Overall risk of dropping out[f]					
High risk	185	86.5	42.7	43.8	3.8
Medium risk	393	88.8	58.8	30.0	4.6
Low risk	204	89.2	73.0	16.2	5.2
Sample size	782				

SOURCES: MDRC calculations from the Career Academies Evaluation Student School Records Database.

NOTES: All characteristics were measured at the time students applied to the Career Academy program and prior to being randomly selected to the Academy group.

Invalid or missing values are not included in individual variable distribution. Rounding may cause slight discrepancies in calculating of sums and differences. Tests of statistical significance were not performed. Sample sizes may vary due to missing data.

[a]These are students who responded that they spoke English "not well" or "not at all."

[b]This was applicable only to students who applied to the Career Academy at the end of their 9th-grade year.

[c]Grade point averages were converted to a standard 4.0 scale from 100-point or 5-point scales for some sites.

[d]A student is defined as overage for grade at the time of random assignment if she or he turns 15 before the start of the 9th grade, or 16 before the start of the 10th grade. This indicates that the student was likely to have been held back in a previous grade.

[e]School mobility is defined as the number of schools attended since the 1st grade beyond the number expected to result from promotions in grade level or graduations.

[f]These subgroups were defined using a combination of the characteristics listed above under "characteristics associated with dropping out of school." See text for details.

bility and dropout are not uncommon problems in most urban high school districts, and they were factors associated with the attrition from the Career Academies in this evaluation. As discussed earlier, nearly one-quarter of the students who never enrolled or left the Academies did so because they moved. This finding suggests that at least part of the attrition from the Academies results more from family relocation patterns than from any particular feature or shortcoming of the Academy (although some families may have moved to find better schools).

However, just over half of those who never enrolled or who enrolled and then left indicated that they chose to do so. It is not unreasonable to expect that a substantial number of the Academy students who enroll in 9th or 10th grade would decide that the Academy program is not the best context in which to pursue their education. In some cases students may leave the Academy because they decide that they are no longer interested in the career theme or in the various work-related learning activities. This attrition need not imply shortcomings in the Academy model or its implementation if the students made the choice to leave because they had access to opportunities that better suited their needs and interests.

Many high schools and school districts around the country are attempting to expand the number of Career Academies they operate. In some cases, there are efforts to convert entire high schools to a series of Career Academies (often referred to as "wall-to-wall" Academies). In these cases, every student in the school would be required to enroll in an Academy beginning in 10th grade (or, in some cases, in 9th grade). The findings on enrollment and attrition from this study suggest that there may not be an excess of demand for Academies, at least under circumstances where students have the opportunity to choose to leave and staff have the opportunity to ask students to leave.

Each of the programs in the study received applications from more students than it was able to serve. This suggests that there was likely to be enough demand for Career Academies to justify expanding the number of programs within the high schools. However, given the opportunity to choose to leave the programs — or, on the part of staff, given the opportunity to dismiss students from the programs — less than 60 percent of the students remained in the programs throughout high school. This suggests that the current programs may be operating at capacity, based on the number of students who choose to stay and whose mobility patterns permit them to do so.

Interpreting the Impact Findings. The fundamental comparison being made in the impact analysis is between outcomes for students who were selected to enroll in an Academy (the Academy group) and outcomes for students who were not selected (the non-Academy group). Differences between the groups were driven by the extent to which the Academy group was exposed to the Academy experiences and the extent to which the non-Academy group was not. The analysis in this chapter shows, however, that not all the students randomly assigned to the Academy group actually enrolled in an Academy. In addition, approximately 6 percent of the students in the non-Academy group were inadvertently allowed to enroll in Academies. Thus, differences between the two groups reflect the Academy-related experiences of those students in the Academy group who enrolled in an Academy (88 percent) and the experiences of those students in the non-Academy group who did not enroll in an Academy (94 percent).

In order to produce unbiased estimates of the Academies' true impact, it is necessary to include all sample members in the analysis, regardless of their Academy enrollment status. For

example, students who dropped out of high school are considered to have attended school for zero days and to have earned zero credits during the period they had left school. To the extent that the Career Academies keep students in their programs and prevent them from dropping out, excluding these zero values from the analysis would lead to a serious underestimation of the program impacts. At the same time, the findings in the chapter show that students in the high-risk subgroup are more likely to leave the Academies. If these students were excluded from the Academy group but not from the non-Academy group, it would appear that the Academies include fewer low-achieving and less engaged students. This would represent a serious overestimation of the impact of Career Academies.

Nevertheless, it is highly unlikely that the Career Academies had much effect on students in the study's Academy group who never enrolled in them. It is also not accurate to assume that the Academies had no effect on students in the study's non-Academy group who did enroll. From this perspective, the impact estimates may be perceived as being "diluted." Thus, it is useful to provide impact estimates that account for these "crossovers" in research status.

In the case of the Career Academies Evaluation, the impacts are adjusted based on the difference in actual enrollment rates among Academy and non-Academy groups. In particular, each of the tables in Chapters 3 and 5 includes the *impact per enrollee* for each outcome. This is defined as the difference between the outcomes of Academy and non-Academy students divided by the difference between the percentage of Academy and non-Academy students who ever enrolled in an Academy. This adjustment is discussed further in Chapter 3.

These adjustments do not substantially change the overall impact story discussed in Chapters 3 and 5. The impact per enrollee can be interpreted as the impact from actually enrolling in an Academy, as opposed to simply being recruited and selected for admission. Chapters 3 and 5 explore the extent to which the patterns of the Impacts of Career Academies on student outcomes vary across different subgroups of students. The analysis presented above suggests that these impacts are not greatly affected by differences across the subgroups in the extent to which these students ever enroll in an Academy. However, it suggests the possibility that impacts are affected by differences in how long subgroups remain in an Academy.

Chapter 3

Career Academy Impacts on Student Engagement, Performance, and Achievement

Chapter 2 described the background characteristics and prior school experiences of the students who are the focus of this report. This chapter evaluates the impact of Career Academies on a broad range of high school outcomes for students at different levels of risk of school failure.

The random assignment research design used in this study provides a uniquely rigorous way to identify the impact of Career Academies. The students in this study were randomly assigned to either the Academy group, which had access to an Academy, or to the non-Academy group, which did not. As a result, the *impact* of the Career Academies is defined as the difference in the outcome levels achieved by Academy students over and above those achieved by their non-Academy counterparts. These impact findings provide the most reliable estimates of the true difference these Academies made for the students they aimed to serve.

Most previous evaluations of Career Academies have tended to focus on program outcomes and impacts for the "typical" or "average" Career Academy student. Like these previous studies, this chapter provides a brief summary of results that are averaged across the diverse group of students and sites participating in this evaluation. However, as discussed in Chapter 2, it is clear from both a substantive and a statistical standpoint that these "average" results mask the high degree of underlying variation in impacts. In particular, the analysis in Chapter 2 revealed that, within this study sample, there are groups of students who had substantially different background characteristics and who, in the absence of the Academy treatment, experienced substantially different academic outcomes at the end of high school.

Therefore, to adequately understand the impact of these Career Academies, it is important to recognize that they affect students differently depending on the types of skills, attributes, and prior experiences that the students bring to the programs. Thus, the impact findings discussed in this chapter are presented separately for the three subgroups of students described in Chapter 2: students at high risk of dropping out and highly likely to be disengaged if they stayed in school (approximately 25 percent of the study sample); students at low risk of dropping out and likely to remain engaged and perform well in school (approximately 25 percent of the study sample); and students at only medium risk of dropping out but not necessarily highly engaged in school (approximately 50 percent of the study sample).[1]

The evidence presented in this chapter suggests the following conclusions:

- Among students most at risk of dropping out, Career Academies significantly improved high school outcomes. The Academies reduced dropout rates, improved attendance, increased academic course-taking, and increased the likelihood that students graduated on time.

[1]Each of these subgroups comprises students from the study's Academy and non-Academy groups as determined at random assignment. As discussed in Appendix B, there are no systematic differences in measured background characteristics between Academy and non-Academy students within each subgroup.

- Among the students least likely to drop out of high school, Career Academies increased the likelihood that students were prepared to graduate on time. Because both Academy and non-Academy students in the low-risk subgroup were likely to remain strongly engaged in high school, the Academies had little or no impact on most indicators of student engagement and performance.

- On average, the Career Academies produced little or no change in outcomes for students in the medium-risk subgroup.

- When data are averaged across the diverse groups of students and sites participating in the evaluation, it appears that the Career Academies produced only modest improvements in students' engagement and performance during high school.

To provide a context for interpreting the estimates presented in this chapter, Section I briefly reviews several important analysis issues.

I. Analysis Issues

When examining the effectiveness of Career Academies in influencing students' behavior and experiences, it is important to distinguish between measures of program "outcomes" and measures of program "impacts." *Outcomes* refers to the measures of student engagement, performance, behaviors, achievement, and attitudes — in this case, during their high school years. The chapter examines five sets of outcomes that were measured through the end of each student's 12th-grade year:

- high school enrollment and attendance rates;

- credits earned and course-taking patterns;

- math and reading achievement test scores;

- use of non-school hours and involvement in negative risk-taking behaviors; and

- steps taken toward further education and work and plans for the future.

As noted in Chapter 1, these outcomes were measured using data collected from school transcript records, a survey that students completed at the end of their 12th-grade year, and a math and reading achievement test that a subsample of students completed at the end of their 12th-grade year.

An *impact* is defined as the effect that a Career Academy has on an outcome. The average outcome levels for students in the Academy group alone provide potentially misleading conclusions. Previous research and prior experience highlight the fact that many students succeed or fail in high school for reasons not related to a special intervention like a Career Academy. In order to determine the net effect, or "value added," of a Career Academy, it is necessary to compare the experiences of a group of students who were exposed to a Career Academy with a similar group of students who also applied but were not selected to enroll. As discussed in Chapter 1, the

Academy and non-Academy groups participating in this study were determined through a random selection process. The non-Academy group serves as a benchmark for how students in the Academy group would have performed if they had not had access to the programs. Therefore, the impacts (differences in outcomes between the Academy and the non-Academy groups) represent the difference in outcomes that Career Academies generate over and above what non-Academy environments do for comparable students.

Unless otherwise noted, the measures presented in the tables for this chapter indicate the percentages of students in the Academy and non-Academy groups who attained a given outcome or reported a given behavior or experience. For example, some tables report the percentages of students who dropped out of high school, who attended 95 percent or more of the time throughout high school, or who earned a sufficient number of course credits to meet the school district's graduation requirements. Other tables report the percentages of students who reported working on volunteer projects, who reported being arrested, or who reported submitting a college application.

Each table compares the percentage of Academy group students who attained a given outcome with the percentage of non-Academy group students who did so. The difference between the groups represents the impact of the Career Academies. The tables also present the percentage change in the non-Academy group outcome level represented by the impact. This is defined as the impact divided by the non-Academy group average. For example, if 60 percent of the Academy group attained a certain outcome compared with 50 percent of the non-Academy group, this 10 percentage point difference would represent a 20 percent increase (10 divided by 50) over the non-Academy group level of 50 percent.

It is important to note that the impact estimates discussed in this report are based on analyses that include all students in both the Academy and the non-Academy groups. This includes both Academy group students who may not have enrolled in a Career Academy and students from both groups who may have dropped out of high school altogether. As discussed in Chapter 2, not all students randomly selected for the Academy group actually enrolled in an Academy. To the extent that these students are different from their counterparts who did enroll (and, more important, different from students in the non-Academy group), excluding them from the analyses would lead to serious misrepresentation of the impacts.

At the same time, it is unlikely that the Academies had any effect on students who were never involved with the program after they were selected to enroll. In an effort to account for this, each table presents the *impact per enrollee*, defined as the estimated impact divided by the difference in actual Academy enrollment rates of Academy and non-Academy students. In other words, the impact per enrollee can be interpreted as the impact from actually enrolling in an Academy, as opposed to simply being recruited and selected for admission.[2]

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[2]This adjustment was proposed by Bloom, 1984, and was used by Orr, Bloom, Bell, Doolittle, Lin, and Cave, 1996. It relies on two assumptions: (1) selection for the Academy group had no effect on students who did not enroll in an Academy and (2) the average outcome levels for non-Academy students who did enroll would have been the same if they had been assigned to the Academy group initially. Thus, the adjustment can be seen as discounting both the zero impact for that portion of the Academy group who did not receive any part of the Academy treatment and the non-zero impact for that portion of the non-Academy group who got the same treatment as the Academy

(continued)

It is also important to note that high school dropouts from both the Academy and the non-Academy groups are included in calculations of outcomes. For example, estimates of average attendance rates or credits earned toward graduation include zero values for school years or semesters in which students were confirmed to have dropped out of high school. To the extent that Career Academies prevent Academy students from dropping out, excluding non-Academy group students with zero values (that is, dropouts) would lead to serious underestimation of program impacts.

Finally, another issue of interpretation concerns the "statistical significance" of impact estimates. *Statistical significance* is a measure of the degree of certainty one may have that some non-zero impact actually occurred. If an impact estimate is statistically significant, then one may conclude with some confidence that the program really had an effect. If an impact estimate is not statistically significant, then the non-zero estimate is more likely to be the product of chance. Unless otherwise noted, the impacts discussed in this chapter were statistically significant at the 10 percent level or lower. This means that there is no more that a 10 percent probability that the difference resulted only from chance.

Statistical significance does not directly indicate the magnitude or importance of an impact estimate — only whether any impact occurred. In an evaluation such as this one, numerically small impact estimates are usually not statistically significant; however, some numerically large impact estimates may not be statistically significant, particularly when sample sizes are small. Smaller sample sizes yield less reliable impact estimates — estimates in which one can have less confidence — than are possible when samples are larger. Therefore, an estimate of a given magnitude that is statistically significant for a relatively large subgroup may not be statistically significant for a smaller subgroup.

II. Career Academy Impacts for Students in the High-Risk Subgroup

This section of the chapter focuses on those students in the study sample who were most likely to drop out of high school or to perform poorly if they stayed in school. As discussed in Chapter 2, this subgroup of students was identified based on background characteristics and school experiences prior to their applying for an Academy program. The high-risk subgroup represents approximately 25 percent of the study sample. The subsequent behavior and performance of students in the non-Academy group provide the best indication of how these students performed in high school without the opportunity to attend an Academy.

In general, non-Academy students in the high-risk subgroup dropped out of high school at relatively high rates and appeared to be quite disengaged if they stayed. In all, nearly one-third of these students dropped out of high school before the end of their 12th-grade year, and approximately one-quarter had earned sufficient credits to meet their districts' graduation requirements. Sixteen percent of the high-risk non-Academy group had completed what might be called a basic core academic curriculum (four credits of English, three credits of social studies, two credits of math, and two credits of science). On average, these students scored below the 20th per-

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enrollees. This adjustment does not account for the fact that some students enrolled in an Academy for a semester or more and then left. Further analysis is needed to explore the impact of different "doses" of Academy treatment.

centile nationally on a standardized math and reading achievement test, and just over 20 percent reported that they had taken the SATs or ACTs by the end of their 12th grade year.

The findings discussed in this section of the chapter indicate that the Career Academies significantly improved high school outcomes among students in the high-risk subgroup. For these students, the Career Academies substantially reduced dropout rates and chronic absenteeism, and they improved attendance, credits earned, course-taking patterns, and preparation for post-secondary educational and employment opportunities. Despite these significant positive impacts, the Academies did not produce changes in the high-risk subgroup's math or reading achievement test scores. Before discussing these findings in detail, it is useful to review the rates at which these students enrolled in and remained in the Academy programs.

Table 3.1 provides a summary of Career Academy impacts on the school enrollment status and attendance rates of students in the high-risk subgroup. The first row of the table shows the percentage of Academy and non-Academy group students who enrolled in a Career Academy. The difference between these percentages represents the basic difference in exposure to the Career Academies between these groups. This is the primary source of impacts that are discussed in this section of the chapter. As noted above, in addition to the basic impact estimates, each table presents the impact per enrollee.

The second row of Table 3.1 shows the percentage of students in the high-risk subgroup who remained enrolled in an Academy through the end of their 12th-grade year. It indicates that 43 percent of the Academy students in the high-risk subgroup did so – just under half of those who initially enrolled. This may be perceived as a high retention rate in the Career Academies, given that many of the students in the high-risk subgroup would have dropped out of high school altogether, if they did not have access to an Academy. Also, as discussed in Chapter 2, a relatively high proportion of the high-risk subgroup came from families with a history of relatively high mobility.

A. Impacts on School Enrollment and Attendance

The third row of Table 3.1 indicates that the Academies significantly reduced the percentage of students in the high-risk subgroup who dropped out of high school. Among those in the non-Academy group, 32 percent dropped out of high school before the end of 12th grade. In other words, without access to an Academy, nearly one-third of the high-risk subgroup left high school before they were scheduled to graduate. By comparison, 21 percent of the high-risk Academy group had dropped out before the end of their 12th-grade year. This 11 percentage point difference represents a 34 percent reduction in dropout rates among students in the high-risk subgroup.

Rows 4 and 6 of Table 3.1 shows that the Academies also improved attendance rates, particularly by reducing chronic absenteeism (defined as attending class less than 85 percent of the time throughout high school). The non-Academy students in the high-risk subgroup, without the opportunity to attend an Academy, had average attendance rates of 76 percent. Over half of these students were chronically absent, but the Academies significantly increased average attendance, from 76 to 82 percent. They also reduced chronic absenteeism, from 53 to 42 percent.

Table 3.1

Career Academies Evaluation

Impacts on School Enrollment and Attendance for Students in the High-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Ever enrolled in a Career Academy during high school (%)	86.4	3.2	83.3 ***		
Was enrolled in a Career Academy at the end of grade 12 (%)	42.5	2.1	40.5 ***		
Dropped out of high school before the end of grade 12 (%)	21.3	32.2	-10.9 ***	-33.8	*-13.1*
Average attendance, grades 9-12 (%)	81.5	76.0	5.6 ***	7.3	*6.7*
More than 95 percent average attendance, grades 9-12 (%)	16.9	12.9	4.0	31.3	*4.8*
Less than 85 percent average attendance, grades 9-12 (%)	41.9	53.4	-11.5 ***	-21.5	*-13.8*
Sample size (N=345)	185	160			

SOURCE: MDRC calculations from Career Academies Evaluation Student School Records Database.

NOTES: Attendance rates include zero values for grades in which sample members were identified as school dropouts. Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. In both cases, statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]Percent change is defined as the impact divided by the non-Academy group average.

[b]Impact per enrollee is defined as the impact divided by the difference in the percentage of Academy and non-Academy group members ever enrolled in a Career Academy. It is italicized because its calculation does not involve a direct comparison of Academy and non-Academy students.

B. Impacts on Credits Earned and Course-Taking

Table 3.2 presents several outcome measures that indicate the distribution of course credits earned by Academy and non-Academy students in the high-risk subgroup.[3] The table indicates

[3]Throughout this report, one credit is equivalent to completing one full-year course, and a half-credit is equivalent to completing one semester-long course. In general, the grouping of courses into subject areas (such as English, math, vocational/career-related, and so on) and subject types (academic and non-academic) follows conventions outlined in NCES, 1995.

Table 3.2

Career Academies Evaluation

Impacts on Credits Earned and Course-Taking for Students in the High-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Credits earned					
Total course credits	19.3	17.3	2.0 ***	11.7	*2.4*
Total course credits meet the graduation requirement (%)	39.9	26.2	13.7 ***	52.3	*16.5*
Earned 12 or more academic course credits (%)	47.6	31.9	15.8 ***	49.5	*19.0*
Earned 8 or more non-academic course credits (%)	46.4	47.2	-0.8	-1.8	*-1.0*
Course-taking					
English (4), Social Studies (3), Math (3), Science (3)[c] (%)	13.9	5.7	8.2	145.4	*9.9*
English (4), Social Studies (3), Math (2), Science (2)[c] (%)	31.8	16.3	15.5 ***	94.8	*18.6*
Earned 2 or more foreign-language credits (%)	26.7	19.1	7.5	39.4	*9.1*
Earned 1/2 or more computer credits (%)	43.4	45.0	-1.6	-3.6	*-2.0*
Earned 3 or more career/vocational credits (%)	58.3	37.7	20.6 ***	54.5	*24.7*
Sample size (N=345)	185	160			

SOURCE: See Table 3.1.

NOTES: Credits include zero values for grades in which sample members were identified as school dropouts. Course credit data were not provided for approximately 4.5 percent of the sample. Course-taking data were not provided for approximately 21 percentof the sample. Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences. All measures indicate credits earned up until the end of the 12th-grade year. 12th-grade year indicates the year that students were projected to reach the 12th grade when they initially enrolled in the Career Academy or regular high school program.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. In both cases, statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]Percent change is defined as the impact divided by the non-Academy group average.

[b]Impact per enrollee is defined as the impact divided by the difference in the percentage of Academy and non-Academy group members ever enrolled in a Career Academy. It is italicized because its calculation does not involve a direct comparison of Academy and non-Academy students.

[c]Numbers refer to the amount of credits that were earned in each subject area.

that Career Academies increased total course credits earned by high-risk students and increased the percentage of students who earned sufficient course credits to meet their districts' graduation requirements. Moreover, much of the increase in total course credits came from an increase in the number of academic course credits earned.

The first row of Table 3.2 reports the average number of course credits earned by Academy and non-Academy students in the high-risk subgroup by the end of their scheduled 12th-grade year.[4] It indicates that the Academies produced an increase of two full credits. While non-Academy students earned an average of approximately 17 credits by the end of 12th grade, their Academy counterparts earned an average of approximately 19 credits. This difference represents an increase of 12 percent over the non-Academy group level.

The second row of Table 3.2 reports the percentage of students in the Academy and non-Academy groups who earned enough credits to meet their districts' graduation requirements by the end of their 12th-grade year.[5] It shows that 26 percent of the high-risk non-Academy group earned enough credits to graduate. By contrast, nearly 40 percent of the Academy group students earned enough credits to graduate. This 14 percentage point difference represents a 52 percent increase over the non-Academy group average.

The remainder of Table 3.2 presents findings on the credits earned in various subject areas by Academy and non-Academy students in the high-risk subgroup. Career Academies significantly increased the number of academic courses students completed, as well as the number of career-related and vocational courses.[6] The third row of the table indicates that the Academies significantly increased the percentage of students in the high-risk subgroup who completed 12 or more academic credits (a minimum of three per year). While 32 percent of the non-Academy group earned 12 or more credits in academic courses, 48 percent of students in the Academy group did so. This 16 percentage point difference represents a 50 percent increase over the non-Academy group average.

This overall increase in academic course credits translated into a substantial increase in the percentage of students who completed a core academic curriculum. The fifth and sixth rows of Table 3.2 indicate the percentages of Academy and non-Academy students from the high-risk subgroup who completed two versions of an academic curriculum that prepared them for college.[7] The second measure (row 6) can be classified as a basic academic core curriculum consisting of four credits of English, three of social studies, two of math, and two of science. The first measure (row 5) might be classified as a more intensive core curriculum that adds an extra credit in both math and science. Many school districts require student to complete this type of

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[4]When available, this measure includes credits that students earned during summer school. Some of the participating school districts were unable to provide a complete record of summer school credits.

[5]Students were considered to have earned enough credits to graduate from high school if their transcripts indicated that they had accumulated the number of credits needed to meet the official graduation requirements in their school district. This ranges from 21 to 24 credits, depending on the district. It is also important to note that this measure does not necessarily indicate that a student actually graduated from high school on time. Most school districts also require students to complete a certain number of courses in specific subject areas.

[6]Academic courses included those in English, social studies, math, science, and foreign language. Non-academic courses were all other courses, including career-related and vocational subjects, accredited work experiences, fine arts, physical education and health, and a broad range of school-specific electives.

[7]These measures have been proposed by the National Center for Education Statistics, see NCES, 1995.

course distribution in order to graduate, and many four-year colleges require that students complete these types of courses for admission.

Table 3.2 indicates that very few non-Academy students in the high-risk subgroup completed enough academic courses to meet requirements for either of the core academic curricula. Sixteen percent of non-Academy students completed the basic academic curriculum, and less than 6 percent completed the more intensive version. In all, Career Academies nearly doubled the percentage of students in the high-risk subgroup who completed the basic core academic curriculum, from 16 percent of the non-Academy group to nearly 32 percent of the Academy group. Although the Academy group students were much more likely than their non-Academy counterparts to complete the more intensive core curriculum, this difference was not statistically significant.

Finally, Table 3.2 shows that although the Academies did not increase the overall number of credits that the high-risk subgroup earned in non-academic subject areas, they substantially increased credits earned in career-related and vocational courses. The fourth row of the table indicates that Academy and non-Academy students were about equally likely to complete eight or more credits in non-academic subject areas. As shown in the last row of the table, however, the Academies increased the percentage of students completing three or more career-related and vocational courses from approximately 38 percent for the non-Academy group to 58 percent for the Academy group — an increase of nearly 55 percent over the non-Academy group average.

In summary, this combination of findings is significant for several reasons. First, many students in the high-risk subgroup were already lagging behind in credits at the time they entered an Academy. Thus, the Academies not only prevented students from dropping out but also helped a number of students close their initial gap in credits and meet the graduation requirements. Second, the Academies' positive impact on credits earned resulted primarily from an increase in academic course-taking and there was no overall increase in non-academic course-taking. In fact, students in the high-risk subgroup were more likely to concentrate their elective and non-academic courses in career-related or vocational subject areas rather than to substitute non-academic courses for academic courses.

C. Impacts on Math and Reading Achievement Test Scores

The evidence presented so far suggests that, among students at high risk of school failure, Career Academies reduced dropout rates and increased engagement in school. The evidence presented below suggests that, despite the effects of Career Academies on these outcomes, they appear to have little or no effect on standardized measures of student achievement in math and reading.

Table 3.3 presents estimates of the differences in achievement test scores between Academy and non-Academy students from the high-risk subgroup. The first row of the table presents the students' average percentile scores on the mathematics portion of the achievement test from the National Educational Longitudinal Study of 1988 (NELS: 88). These percentile scores reflect the average performance of students relative to the sample of 17- to 18-year-olds who made up

Table 3.3

Career Academies Evaluation

Impacts on Achievement Test Scores for Students in the High-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Math achievement test scores					
Average national percentile	19.5	16.1	3.5	21.7	*4.2*
Proficiency level (%)					
1: Rote memory operations	74.1	62.5	11.6	18.5	*13.9*
3: Simple problem-solving	11.0	12.1	-1.2	-9.6	*-1.4*
Reading achievement test scores					
Average national percentile	23.4	18.9	4.6	24.2	*5.5*
Proficiency level (%)					
1: Simple comprehension	69.2	70.8	-1.6	-2.3	*-1.9*
2: Simple inferences	27.6	17.3	10.3	59.8	*12.4*
Sample size (N=110)	63	47			

SOURCE: MDRC calculations from Career Academies Evaluation 12th Grade Achievement Test Database.

NOTES: Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences. The reading and math achievement tests are the cognitive battery tests of reading and mathematics used in the NELS: 88 study. There were a total of five proficiency levels for mathematics and three for reading. Particular proficiency levels are reported in the table to illustrate general trends in performance in the distribution of students. Percentile scores reflect students' performance in relation to a nationally representative sample of 12th-graders.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. In both cases, statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]Percent change is defined as the impact divided by the non-Academy group average.

[b]Impact per enrollee is defined as the impact divided by the difference in the percentage of Academy and non-Academy group members ever enrolled in a Career Academy. It is italicized because its calculation does not involve a direct comparison of Academy and non-Academy students.

the original NELS: 88 sample.[8] The table indicates that, on average, the non-Academy students in the high-risk subgroup scored at the 16th percentile on the math achievement test and at the 19th

[8]The NELS: 88 sample comprised a nationally representative group of students who were identified as 8th-graders in 1988. These young people were surveyed every two years through 1992, when they were scheduled to graduate from high school, and again in 1994, approximately two years after scheduled graduation. The achievement test being used in the Career Academies Evaluation was administered to the NELS: 88 sample in 1992, at the end of their 12th-grade year.

percentile on the reading achievement test. Although students in the high-risk Academy group scored somewhat higher, the differences were not statistically significant.

The second and third rows of Table 3.3 present the percentages of Academy and non-Academy students in the high-risk subgroup who, on the basis of their test scores, exhibited proficiency at each of two different levels of math skills. Overall, the testing instrument covers five levels of math proficiency. Level 1 represents the most basic skills, and level 5 represents the highest. Level 1, or basic proficiency, includes the abilities to perform simple rote memory operations and to carry out simple arithmetical operations on whole numbers. Level 3 reflects a somewhat more advanced level of proficiency, including the ability to perform simple problem-solving.[9] Table 3.3 indicates that the Academy students were somewhat more likely to attain the basic proficiency level than their non-Academy counterparts. Again, however, this difference is not statistically significant, indicating that there was no systematic difference between the Academy and non-Academy students on this measure. The table also indicates that very few of the high-risk subgroup attained the third level of proficiency and that the Academy and non-Academy students were about equally likely to do so.

The results for reading achievement test scores show a similar pattern. The average percentile scores on the reading portion of the NELS: 88 achievement test indicate that non-Academy students scored at about the bottom fifth of the national distribution. Although the Academy group scored somewhat higher, the difference was not statistically significant. The reading test included three levels of proficiency. Approximately 70 percent of students in the Academy and non-Academy groups scored at level 1, demonstrating basic reading comprehension skills. Students in the Academy group were somewhat more likely than their counterparts in the non-Academy group to attain level 2 reading proficiency, indicating that they were able to make "simple inferences" from a reading passage. Again, however, these differences were not statistically significant.

D. Impacts on Youth Development Experiences

Beyond their effect on student performance and engagement in school, Career Academies are intended to improve a variety of outcomes that have been identified as important to youth development more generally. In particular, Career Academies aim to increase students' contact with caring adults and to help them make constructive use of non-school hours. To the extent that this occurs, one might expect the high-risk Academy group to have more developmentally healthy high school experiences, to participate more in extracurricular activities, and to better avoid negative behaviors.

The first three rows of Table 3.4 show the distribution of time spent on homework among Academy and non-Academy students in the high-risk subgroup. These estimates suggest that there were no systematic differences in the amount of time that these students spent on homework.

Table 3.4 does indicate that the Academies increased the percentage of students who reported spending some time in extracurricular activities. Specifically, 69 percent of students in the high-risk non-Academy group indicated that they did not spend any time in extracur-

[9]NCES, 1995.

ricular activities during their 12th-grade year. By contrast, 59 percent of the Academy students indicated that they had not participated in extracurricular activities. To the extent that participation in extracurricular activities is an effective measure of engagement, this indicates that, among the high-risk subgroup, Academy students were more engaged in school than their non-Academy counterparts.

Table 3.4

Career Academies Evaluation

Impacts on Experiences During the 12th Grade Year for Students in the High-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Use of non-school hours					
Average time spent on homework (%)					
Less than 1 hour per week	49.8	52.5	-2.7	-5.2	*-3.3*
2 to 6 hours per week	34.7	36.6	-1.9	-5.3	*-2.3*
More than 6 hours per week	15.5	10.9	4.6	42.8	*5.6*
Average time spent on extra-curricular activities (%)					
None	58.5	68.9	-10.4 **	-15.2	*-12.5*
1 to 4 hours per week	23.5	18.4	5.2	28.2	*6.2*
More than 4 hours per week	18.0	12.7	5.3	41.4	*6.3*
Youth development experiences					
Reported any positive youth development experiences in past year (%)[c]	62.7	55.2	7.5	13.5	*9.0*
Worked on a volunteer project	41.9	31.6	10.3 **	32.7	*12.4*
Received award for participation in athletics or a school organization	40.6	34.8	5.9	16.9	*7.0*
Received an academic award or scholarship	26.6	15.5	11.1 **	71.6	*13.3*
Reported any risk-taking behaviors in past year (%)[d]	34.8	39.1	-4.3	-11.0	*5.2*
Has become a parent or is pregnant	20.5	21.4	-1.0	-4.5	*1.1*
Has been expelled from school	9.0	8.3	0.8	9.4	*0.9*
Has come to school high on drugs or alcohol	8.0	11.1	-3.1	-28.3	*3.8*
Has been arrested	8.6	13.4	-4.8 *	-36.0	*5.8*
Sample size (N=366)	202	164			

(continued)

Table 3.4 (continued)

SOURCE: MDRC calculations from Career Academies Evaluation 12th Grade Survey Database.

NOTES: 12th grade year indicates the year that students were projected to reach the 12th grade when they initially enrolled in the Career Academy or regular high school program. Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. In both cases, statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]Percent change is defined as the impact divided by the non-Academy group average.

[b]Impact per enrollee is defined as the impact divided by the difference in the percentage of Academy and non-Academy group members ever enrolled in a Career Academy. It is italicized because its calculation does not involve a direct comparison of Academy and non-Academy students.

[c]Students reported one or more of the positive youth development submeasures.

[d]Students reported one or more of the risk-taking behaviors submeasures.

The bottom panel of Table 3.4 lists the percentages of students who reported participation in various positive and negative youth development experiences. Specifically, the 12th Grade Survey asked students whether, during the past year, they had worked on a volunteer project in their community, received an award or recognition for participation in an athletic team or school organization, or received an academic award or scholarship. The 12th Grade Survey also asked students whether they had become a parent or were currently pregnant, had been expelled from school, had come to school high on drugs or alcohol, or had been arrested.

The findings presented in Table 3.4 indicate that the Career Academies increased high-risk students' involvement in volunteer projects and increased the likelihood that they received recognition for academic performance. Academies also reduced the percentage of students who had been arrested.

E. Impacts on Plans and Steps Taken Toward Post-Secondary Education and Work

The 12th Grade survey also asked students about their plans and preparation for college and work. Table 3.5 presents a summary of the impacts that Career Academies had on students' future plans, the steps they took toward admission to a two- or four-year college, and their overall outlook for the future. The findings for the high-risk subgroup indicate that Career Academies had a small impact on students' educational plans for the next year, at least in terms of reducing the likelihood that they reported being unsure of whether they were going to school or work. The Academies also increased the percentage of students in the high-risk subgroup who took a number of important steps toward attending a two-year or four-year college, and they enhanced students' ultimate expectations for their educational attainment.

The top four rows of the table present the distribution of students who planned to attend school, work, or combine the two during the year following their scheduled graduation. In general, the table shows that the vast majority of students in both the Academy and the non-Academy groups planned to combine school and work. The estimates indicate that approximately the same proportions of Academy and non-Academy students planned to attend school only, work only, or combine school and work. The last row in this section of the table does show that

Academy students were somewhat less likely than their non-Academy counterparts to report that they did not know whether they would attend school or go to work during the following year. Thus, the Academies appear to help students plan for some type of constructive activities after high school.

The Academies increased the extent to which students in the high-risk subgroup were prepared to execute their plans for post-secondary education and employment. Table 3.5 shows the percentages of Academy and non-Academy students in the high-risk subgroup who reported completing a variety of steps needed to apply for and attend college or to find a job. These activities included collecting information about two- and four-year colleges, taking the SATs or ACTs, submitting an application, and having an interview. The measures in Table 3.5 indicate the percentage of students who reported completing these activities,[10] as well as the percentage of students who completed various activities aimed at securing a job during the following year.

Table 3.5 first indicates that the Academies significantly increased the percentage of students in the high-risk subgroup who researched college options, took the SATs or ACTs, and submitted an application to a two-year or four-year college. For example, it shows that 22 percent of non-Academy students reported taking the SATs or ACTs during their 12th-grade year, compared with 35 percent of Academy students in the high-risk subgroup. This 12 percentage point difference represents a 55 percent increase over the non-Academy group average. In addition, just over half of the Academy group students reported that they had submitted an application to a two-year or a four-year college, compared with 35 percent of the students in the non-Academy group.

Table 3.5 also shows that the Academies produced slight increases in the percentages of students in the high-risk subgroup who took concrete steps toward post-secondary employment, although none of these differences was statistically significant.

Finally, the last several rows in Table 3.5 provide an indication of students' educational expectations and general outlook for their future. Most notably, the Academy students were more likely than their non-Academy counterparts to report that they expected to graduate from college.

III. Career Academy Impacts for Students in the Low-Risk Subgroup

The behavior and performance of the students in the low-risk non-Academy group provide the best indication of how these students performed in high school without the opportunity to attend an Academy. In general, these students were unlikely to drop out and appeared to remain engaged in high school on a number of dimensions. In all, only 3 percent of the low-risk non-Academy group dropped out of high school before the end of their 12th-grade year, and approximately three-quarters had earned sufficient credits to meet their districts' graduation requirements. Just over 60 percent had completed the basic core academic curriculum, and over one-third had completed the more intensive core curriculum. On average, these students scored at

[10]Students were asked about these activities in terms of their efforts to attend a two-year or a four-year college. Information-gathering activities included talking with a teacher or other advisor about college, looking at college catalogues, visiting a college campus, and talking with one's parents about how to pay for college. The measures presented in Table 3.5 indicate the percentage of students who reported engaging in two or more of these activities.

about the 40th percentile nationally on a standardized math and reading achievement test. Sixty percent of non-Academy students in the low-risk subgroup reported that they had taken the SATs or ACTs, and nearly 80 percent reported that they had submitted an application to a two-year or a four-year college by the end of their 12th-grade year.

Table 3.5

Career Academies Evaluation

Impacts on Planning and Preparation for College and Work for Students in the High-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Plans for next year (%)					
School only	8.7	6.7	2.0	30.4	*2.4*
Work only	8.3	7.1	1.2	17.2	*1.5*
Combine school and work	79.3	78.9	0.4	0.5	*0.4*
Unknown	3.7	7.3	-3.6 **	-49.7	*-4.4*
Steps taken toward 2-year or 4-year college admission					
Researched college options[c]	82.1	72.5	9.6 ***	13.2	*11.5*
Took SATs or ACTs	34.5	22.3	12.2 **	55.0	*14.7*
Submitted an application	50.5	35.3	15.2 ***	43.1	*18.3*
Had an interview	24.8	18.5	6.3	34.1	*7.6*
Steps taken toward post-secondary employment (%)					
Talked with a teacher or advisor about a job	44.1	43.8	0.3	0.6	*0.3*
Submitted an application for employment	60.7	55.8	4.9	8.7	*5.9*
Interviewed for a position	46.2	43.6	2.7	6.2	*3.2*
Has previous work experience with prospective employer	35.3	31.1	4.2	13.5	*5.0*
Education expectations (%)					
Complete some post-secondary education	91.6	91.7	-0.1	-0.1	*-0.1*
Attend college	71.3	66.1	5.2	7.9	*6.3*
Graduate from college	53.7	45.3	8.3 *	18.4	*10.0*
Has overall positive outlook for the future[d]	72.6	66.0	6.6	10.0	*7.9*
Sample size (N= 366)	202	164			

(continued)

Table 3.5 (continued)

SOURCE: MDRC calculations from Career Academies Evaluation 12th Grade Survey Database.

NOTES: Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. In both cases, statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]Percent change is defined as the impact divided by the non-Academy group average.

[b]Impact per enrollee is defined as the impact divided by the difference in the percentage of Academy and non-Academy group members ever enrolled in a Career Academy. It is italicized because its calculation does not involve a direct comparison of Academy and non-Academy students.

[c]Indicates student engaged in two or more of the following activities: talking with teachers or advisors about college, discussing financing with parents, looking at college catalogues, or visiting schools.

[d]Overall positive outlook for the future was defined by high ratings on questions about expectations for achievement, potential for attaining jobs, and knowledge of methods of finding jobs.

For students in the low-risk Academy group, the findings discussed in this section indicate that, on most outcome measures, they remained engaged in high school at levels similar to their non-Academy counterparts. The findings also show, however, that the Career Academies did improve several important outcomes. Academies significantly increased the likelihood that these students would earn sufficient credits to meet their districts' graduation requirements. They also increased career-related and vocational course-taking while enabling students in the low-risk subgroup to keep pace with their non-Academy peers in academic course-taking. The Academy students were somewhat less likely than their non-Academy counterparts to report that they had submitted an application to a two-year or a four-year college by the end of their 12th-grade year. Finally, the Academies did not produce systematic changes in the low-risk Academy group's math or reading achievement test scores.

Table 3.6 provides a summary of Career Academy impacts on the school enrollment status and attendance rates of students in the low-risk subgroup. The first row in the table shows the percentages of Academy and non-Academy students who enrolled in a Career Academy. Most notably, it shows that 10 percent of students in the non-Academy group enrolled in a Career Academy. Although 8 percent of the non-Academy group students were identified as being enrolled in an Academy at the end of 12th grade, very few of these students were enrolled in an Academy throughout high school. Further analysis of this finding indicated that most of the non-Academy students enrolled in an Academy in 11th or 12th grade, typically because they were interested in taking elective classes that were offered only within the Career Academies.

The second row of Table 3.6 shows the percentage of students in the low-risk subgroup who remained enrolled in an Academy through the end of their 12th-grade year. A relatively high percentage in the Academy group (nearly 74 percent of those initially selected) remained in the programs through the end of 12th grade. This represents 82 percent of those who initially enrolled — a rate that is particularly high compared with the retention rate of students in the high-risk subgroup.

Table 3.6

Career Academies Evaluation

Impacts on School Enrollment and Attendance for Students in the Low-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Ever enrolled in a Career Academy during high school (%)	89.5	10.2	79.3 ***		
Was enrolled in a Career Academy at the end of grade 12 (%)	73.5	8.3	65.2 ***		
Dropped out of high school before the end of grade 12 (%)	1.9	2.9	-1.0	-34.4	*-1.2*
Average attendance, grades 9-12 (%)	95.0	94.2	0.8	0.8	*1.0*
More than 95 percent average attendance, grades 9-12 (%)	67.3	68.9	-1.6	-2.3	*-2.0*
Less than 85 percent average attendance, grades 9-12 (%)	2.2	7.5	-5.3	-70.8	*-6.7*
Sample size (N=385)	204	181			

SOURCE: See Table 3.1.

NOTES: See Table 3.1.

A. Impacts on School Enrollment and Attendance

Table 3.6 reports the dropout rates and average attendance rates for students in the low-risk subgroup. This data indicate that Career Academies had no significant impact on these students' attendance or retention in high school. A likely explanation for this finding is that very few students in the "low-risk" subgroup dropped out of high school, and few exhibited attendance problems or chronic absenteeism.

In general, Table 3.6 shows that students in the low-risk subgroup were likely to remain enrolled in high school and to attend regularly, regardless of whether they were in a Career Academy. Very few students in the low-risk subgroup dropped out of high school (3 percent of the non-Academy group and 2 percent of the Academy group). Although this is in sharp contrast to the relatively high dropout rates among students in the high-risk subgroup, it was difficult for the Career Academies to improve on the very low dropout rates of non-Academy students in the low-risk subgroup. Similarly, average attendance rates were nearly 95 percent throughout high school for Academy and non-Academy group students. Interestingly, for the low-risk subgroup, the Academies did produce a slight reduction in chronic absenteeism (defined as having attendance rates of 85 percent or less throughout high school), although this difference was not statistically significant.

B. Impacts on Credits Earned and Course-Taking

Table 3.7 shows the distribution of course credits earned by Academy and non-Academy students in the low-risk subgroup. It indicates that Career Academies increased the percentage of these students who earned enough total credits to meet their districts' graduation requirements. In particular, while approximately 75 percent of non-Academy students in this subgroup earned enough credits to meet the graduation requirement, nearly 86 percent of students in the Academy group did so. This 11 percentage point difference represents a 15 percent increase over the non-Academy group average. This finding suggests that although students in the low-risk subgroup of the study sample were highly unlikely to drop out of high school, a significant portion did not remain on course to earn enough credits to graduate on time. The Career Academies increased the likelihood that they would.

The Career Academies also changed the mix of courses that students in the low-risk subgroup completed during high school. Most notably, the Academies substantially increased the number of non-academic courses these students completed, particularly career-related and vocational courses. For example, the last row of Table 3.7 indicates that 42 percent of the low-risk non-Academy group completed three or more credits in career-related or vocational courses, compared with approximately 77 percent of students in the low-risk Academy group. This is more than an 80 percent increase in career-related or vocational course-taking.

Table 3.7 also shows that this increase did not come at the expense of students' completing academic courses, nor did it reduce the percentage of students in the low-risk subgroup who completed either the basic or the more intensive core academic curriculum. For example, 85 percent of the Academy group and approximately 89 percent of the non-Academy group completed 12 or more academic credits (a difference that was not statistically significant).

Table 3.7 does suggest, however, that the increase in career-related and vocational courses may have led the Academy group students to take fewer foreign-language courses. For example, 74 percent of the non-Academy group students earned at least two course credits in a foreign language, compared with 50 percent of the Academy group students. This represents nearly a one-third reduction in the non-Academy group average. It is not clear how this potential tradeoff may affect Academy students' attractiveness to colleges, particularly four-year colleges that may prefer or require students to complete a foreign-language sequence during high school.

C. Impacts on Math and Reading Achievement Test Scores

Table 3.8 presents estimates of the impact of Career Academies on standardized measures of student achievement for the low-risk subgroup. In general, these findings do not reveal any systematic differences between Academy and non-Academy students; they exhibited similar levels of academic achievement as measured by standardized tests.

Both Academy and non-Academy students in the low-risk subgroup had math scores averaging at about the 39th percentile nationally. The vast majority of students in both groups performed at the basic proficiency level or higher, and just over 40 percent of both groups scored at the middle proficiency level or higher. Although the reading test scores of Academy students in the low-risk subgroup were slightly lower than those of non-Academy students, the differences were not statistically significant.

Table 3.7

Career Academies Evaluation

Impacts on Credits Earned and Course-Taking for Students in the Low-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Credits earned					
Total course credits	24.4	23.6	0.8	3.2	*0.9*
Total course credits meet the graduation requirement (%)	85.7	74.6	11.1 **	14.9	*14.0*
Earned 12 or more academic course credits (%)	85.0	88.5	-3.5	-3.9	*-4.4*
Earned 8 or more non-academic course credits (%)	68.4	51.1	17.2 ***	33.7	*21.7*
Course-taking					
English (4), Social Studies (3), Math (3), Science (3)[c] (%)	39.2	36.3	2.9	8.1	*3.7*
English (4), Social Studies (3), Math (2), Science (2)[c] (%)	58.5	61.2	-2.7	-4.4	*-3.4*
Earned 2 or more foreign-language credits (%)	49.5	73.6	-24.1 ***	-32.8	*-30.4*
Earned 1/2 or more computer credits (%)	59.2	65.4	-6.1	-9.4	*-7.7*
Earned 3 or more career/vocational credits (%)	76.5	42.0	34.6 ***	82.4	*43.6*
Sample size (N=385)	204	181			

SOURCE: See Table 3.2.

NOTES: See Table 3.2.

Table 3.8

Career Academies Evaluation

Impacts on Achievement Test Scores for Students in the Low-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Math achievement test scores					
Average national percentile	38.6	39.1	-0.5	-1.2	*-0.6*
Proficiency level (%)					
1: Rote memory operations	91.0	86.0	5.0	5.9	*6.3*
3: Simple problem-solving	45.8	42.3	3.5	8.3	*4.4*
Reading achievement test scores					
Average national percentile	37.3	39.8	-2.5	-6.3	*-3.2*
Proficiency level (%)					
1: Simple comprehension	86.6	95.6	-9.0	-9.4	*-11.4*
2: Simple inferences	40.0	49.2	-9.2	-18.7	*-11.6*
Sample size (N=147)	80	67			

SOURCE: See Table 3.3.

NOTES: See Table 3.3.

D. Impacts on Youth Development Experiences

Table 3.9 shows the impacts that Career Academies had on a variety of student experiences during 12th grade. In general, these estimates do not reveal substantial differences between Academy and non-Academy students in the low-risk subgroup, who exhibited similar levels of participation both in positive youth development activities and in negative risk-taking behaviors. Career Academies did produce a modest increase in the percentage of students in the low-risk subgroup who were involved in a volunteer project during their 12th-grade year.

E. Impacts on Plans and Steps Taken Toward Post-Secondary Education and Work

Table 3.10 lists a set of indicators of students' plans and preparation for education and work during the year following their 12th-grade year. It shows that the vast majority of Academy and non-Academy students in the low-risk subgroup reported that they planned both to work and to go to school in the following year. The second-to-last row of the table also indicates that about three-quarters of both Academy and non-Academy students reported that they eventually expect to graduate from college.

Table 3.9

Career Academies Evaluation

Impacts on Experiences During the 12th Grade Year for Students in the Low-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Use of non-school hours					
Average time spent on homework (%)					
Less than 1 hour per week	23.0	24.6	-1.6	-6.6	*-2.0*
2 to 6 hours per week	58.4	49.6	8.8 *	17.7	*11.0*
More than 6 hours per week	18.7	25.8	-7.1 *	-27.6	*-9.0*
Average time spent on extra-curricular activities (%)					
None	36.5	33.0	3.6	10.8	*4.5*
1 to 4 hours per week	29.0	33.4	-4.4	-13.3	*-5.6*
More than 4 hours per week	34.5	33.6	0.9	2.6	*1.1*
Youth development experiences					
Reported any positive youth development experiences in past year (%)[c]	80.3	75.9	4.4	5.7	*5.5*
Worked on a volunteer project	65.8	50.0	15.9 ***	31.7	*20.0*
Received award for participation in athletics or a school organization	56.0	56.2	-0.2	-0.4	*-0.3*
Received an academic award or scholarship	41.7	36.9	4.8	12.9	*6.0*
Reported any risk-taking behaviors in past year (%)[d]	15.6	16.1	-0.5	-2.9	*-0.6*
Has become a parent or is pregnant	6.0	4.6	1.4	30.5	*1.8*
Has been expelled from school	1.7	2.0	-0.3	-13.3	*-0.3*
Has come to school high on drugs or alcohol	6.5	9.7	-3.3	-33.6	*-4.1*
Has been arrested	4.4	4.5	-0.1	-1.8	*-0.1*
Sample size (N=389)	218	171			

SOURCE: See Table 3.4.

NOTES: See Table 3.4.

Table 3.10

Career Academies Evaluation

Impacts on Planning and Preparation for College and Work for Students in the Low-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Plans for next year (%)					
School only	9.2	8.9	0.3	2.9	*0.3*
Work only	2.2	2.6	-0.4	-15.7	*-0.5*
Combine school and work	86.3	86.9	-0.6	-0.6	*-0.7*
Unknown	2.4	1.7	0.7	41.9	*0.9*
Steps taken toward 2-year or 4-year college admission					
Researched college options[c]	92.7	96.3	-3.7	-3.8	*-4.6*
Took SATs or ACTs	60.0	60.0	-0.1	-0.1	*-0.1*
Submitted an application	70.8	78.7	-7.9 *	-10.0	*-10.0*
Had an interview	23.0	29.8	-6.7	-22.6	*-8.5*
Steps taken toward post-secondary employment (%)					
Talked with a teacher or advisor about a job	47.6	37.8	9.8 *	25.9	*12.4*
Submitted an application for employment	55.8	56.6	-0.8	-1.5	*-1.1*
Interviewed for a position	38.7	38.7	-0.1	-0.2	*-0.1*
Has previous work experience with prospective employer	27.7	26.8	0.9	3.4	*1.2*
Education expectations (%)					
Complete some post-secondary education	97.4	97.3	0.0	0.0	*0.0*
Attend college	88.7	85.8	2.8	3.3	*3.6*
Graduate from college	75.2	74.5	0.6	0.9	*0.8*
Has overall positive outlook for the future[d]	78.4	78.1	0.2	0.3	*0.3*
Sample size (N=389)	218	171			

SOURCE: See Table 3.5.

NOTES: See Table 3.5.

Table 3.10 does indicate that students in the Academy group were somewhat less likely than their non-Academy counterparts to have submitted an application to a two-year or four-year college by the end of their 12th-grade year. Interestingly, over 90 percent of students in both groups had investigated college options, and 60 percent had taken the SATs or ACTs — a critical step in applying for college. However, whereas 79 percent of students in the non-Academy group had submitted an application to college, only 71 percent of Academy students in the low-risk subgroup had done so.

The reason for this lower rate of applying for college is not clear. One hypothesis is that Academy students in the low-risk subgroup may have been opting to go to work rather than to college. In general, there does not appear to be any support for this hypothesis. First, as noted earlier, Academy and non-Academy students were about equally likely to report that they planned to work or to combine work and school in the year following graduation. Table 3.10 also indicates that the groups were about equally likely to have applied or interviewed for a job for the following year. Another hypothesis is that Academy students may have been more likely to plan on attending a two-year college, many of which may not require a formal application to be submitted while students are still in high school. The 12th Grade Survey did not ask students to differentiate between activities aimed at a two-year as opposed to a four-year college.

The findings regarding students' post-secondary activities are not clear. A longer follow-up period is needed to determine the actual college enrollment and completion rates of the Academy and non-Academy groups and to assess the types of college programs they attend. This is a key feature of the second phase of the Career Academies Evaluation, which includes asking students in the study sample to complete a survey 12 months after their scheduled graduation from high school and again four years after their scheduled graduation.

IV. Career Academy Impacts for Students in the Medium-Risk Subgroup

The final subgroup of students include those who were not at particularly high risk of dropping out of high school, but appeared to exhibit at least a moderate level of disengagement from school. This medium-risk subgroup represents about half the student sample. Overall, 8 percent of non-Academy students in the medium-risk subgroup dropped out of high school before the end of their 12th-grade year, and approximately two-thirds earned sufficient credits to meet their districts' graduation requirements. Just over half completed the basic core academic curriculum, and about 30 percent completed the more intensive core curriculum. On average, these students scored at about the 30th percentile nationally on a standardized math and achievement test and at the 35th percentile in a standardized reading test. About 47 percent of non-Academy students in the medium-risk subgroup reported that they had taken the SATs or ACTs, and over 60 percent reported that they had submitted an application to a two-year or a four-year college by the end of their 12th-grade year.

The findings discussed in this section indicate that, on average, the Career Academies had little or no impact on most outcomes for students in the medium-risk subgroup. In other words, most outcome levels for students in the Academy group were about the same as they were for students in the non-Academy group. As discussed in Chapter 5, however, these overall averages for students in the medium-risk subgroup mask a high degree of variation in impacts across the sites in the study.

Table 3.11 provides a summary of Career Academy impacts on the school enrollment status and attendance rates of students in the medium-risk subgroup. The first two rows of the table show that 89 percent of the Academy group enrolled in an Academy during at least one semester of high school and that 59 percent remained enrolled in the programs through the end of their 12th-grade year. This means that, on average, about two-thirds of students in the medium-risk subgroup who initially enrolled in an Academy remained in the program throughout high school.

A. Impacts on School Enrollment and Attendance

Table 3.11 shows the average school enrollment and attendance outcomes among students in the medium-risk subgroup. The data suggest that the Career Academies had no impact on dropout prevention or average attendance for this subgroup. The third row of the table provides an estimate of the dropout rate among Academy and non-Academy students in this subgroup. It shows that 9 percent of Academy students in the medium-risk subgroup dropped out of high school, compared with 8 percent of their non-Academy peers. This difference was not statistically significant. Similarly, the next three rows present estimates of several different measures of attendance among Academy and non-Academy students in this subgroup. The results suggest no systematic differences in the attendance patterns of Academy and non-Academy students in the medium-risk subgroup.

Table 3.11

Career Academies Evaluation

Impacts on School Enrollment and Attendance for Students in the Medium-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per enrollee*[b]
Ever enrolled in a Career Academy during high school (%)	89.0	6.7	82.3 ***		
Was enrolled in a Career Academy at the end of grade 12 (%)	58.8	3.0	55.9 ***		
Dropped out of high school before the end of grade 12 (%)	9.0	8.0	1.0	12.1	*1.2*
Average attendance, grades 9-12 (%)	88.4	89.6	-1.2	-1.4	*-1.5*
More than 95 percent average attendance, grades 9-12 (%)	36.2	37.7	-1.5	-3.9	*-1.8*
Less than 85 percent average attendance, grades 9-12 (%)	22.4	19.3	3.1	15.9	*3.7*
Sample size (N = 724)	393	331			

SOURCE: See Table 3.1.

NOTES: See Table 3.1.

B. Impacts on Credits Earned and Course-Taking

Table 3.12 presents measures of course-taking patterns for Academy and non-Academy students in the medium-risk subgroup. The top panel of the table indicates that the Academies did not have a systematic effect on the number of credits students earned in high school or on the number of credits they earned in academic and non-academic courses. Also, about 65 percent of students in both the medium-risk Academy and non-Academy groups had earned sufficient credits to meet their districts' graduation requirements.

Table 3.12

Career Academies Evaluation

Impacts on Credits Earned and Course-Taking for Students in the Medium-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Credits earned					
Total course credits	22.6	22.9	-0.4	-1.6	*-0.4*
Total course credits meet the graduation requirement (%)	64.8	65.2	-0.3	-0.5	*0.4*
Earned 12 or more academic course credits (%)	69.8	69.4	0.4	0.6	*0.5*
Earned 8 or more non-academic course credits (%)	59.1	56.9	2.2	3.9	*2.7*
Course-taking					
English (4), Social Studies (3), Math (3), Science (3)[c] (%)	28.8	30.5	-1.7	-5.6	*-2.1*
English (4), Social Studies (3), Math (2), Science (2)[c] (%)	48.7	51.0	-2.3	-4.4	*-2.7*
Earned 2 or more foreign-language credits (%)	42.2	49.0	-6.8 *	-13.9	*-8.3*
Earned 1/2 or more computer credits (%)	66.3	57.7	8.6 **	15.0	*10.5*
Earned 3 or more career/vocational credits (%)	65.7	48.4	17.3 ***	35.9	*21.1*
Sample size (N=724)	393	331			

SOURCE: See Table 3.2.

NOTES: See Table 3.2.

Table 3.12 does indicate that the Academies produced changes in some specific subject areas for the medium-risk subgroups. Academy students were more likely to complete three or more credits in career-related or vocational courses and were more likely to complete at least one semester of computer-related courses. At the same time, the Academies reduced the percentage of students who completed a sequence of at least two years in a foreign language. Given that there was no overall change in the total number of non-academic credits earned by students in the medium-risk subgroups, it appears that the Academy students were taking the career-related and computer-related courses instead of other non-Academy courses or electives. Also, because there was no overall reduction in academic course-taking, it appears that Academy students were more likely than their non-Academy counterparts to take other academic courses instead of a foreign language.

C. Impacts on Math and Reading Achievement Test Scores

Table 3.13 summarizes the results for students in the medium-risk subgroup who took the NELS: 88 reading and math achievement tests. It appears that the Academies produced a slight reduction in reading test scores. On average, students in the non-Academy group scored at the 35th percentile nationally, compared with the 31st percentile for Academy group students. It is possible that some of this difference may be due to differences in the composition of the Academy and non-Academy students who completed the achievement tests. This may have resulted from the fact that the medium-risk Academy students were somewhat more likely than medium-risk non-Academy students to complete the test.

Table 3.13

Career Academies Evaluation

Impacts on Achievement Test Scores for Students in the Medium-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Math achievement test scores					
Average national percentile	29.1	29.7	-0.6	-2.0	*-0.7*
Proficiency level (%)					
1: Rote memory operations	84.8	80.9	3.9	4.8	*4.7*
3: Simple problem-solving	28.5	31.3	-2.8	-8.9	*-3.4*
Reading achievement test scores					
Average national percentile	30.8	35.1	-4.3 *	-12.2	*-5.2*
Proficiency level (%)					
1: Simple comprehension	80.1	85.9	-5.7	-6.7	*-7.0*
2: Simple inferences	39.7	43.5	-3.8	-8.7	*-4.6*
Sample size (N=233)	124	109			

SOURCE: See Table 3.3.

NOTES: See Table 3.3.

D. Impacts on Youth Development Experiences

Table 3.14 lists measures of various high school experiences and extracurricular activities among Academy and non-Academy students in the medium-risk subgroup. In general, the table indicates that there was no systematic difference between Academy and non-Academy students in terms of their use of non-school hours or in their exposure to various positive or risk-related activities.

Table 3.14

Career Academies Evaluation

Impacts on Experiences During the 12th Grade Year for Students in the Medium-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Use of non-school hours					
Average time spent on homework (%)					
Less than 1 hour per week	37.0	32.9	4.1	12.4	*5.0*
2 to 6 hours per week	47.9	46.0	1.9	4.1	*2.3*
More than 6 hours per week	15.1	21.1	-6.0 **	-28.3	*-7.2*
Average time spent on extra-curricular activities (%)					
None	47.0	52.3	-5.3	-10.1	*-6.4*
1 to 4 hours per week	30.3	25.9	4.4	17.0	*5.3*
More than 4 hours per week	22.7	21.8	0.9	4.2	*1.1*
Youth development experiences					
Reported any positive youth development experiences in past year (%)[c]	71.3	69.2	2.0	2.9	*2.5*
Worked on a volunteer project	53.7	48.9	4.8	9.8	*5.8*
Received award for participation in athletics or a school organization	46.7	41.7	5.0	11.9	*6.0*
Received an academic award or scholarship	28.0	25.1	2.8	11.3	*3.4*
Reported any risk-taking behaviors in past year (%)[d]	23.8	25.6	-1.8	-7.2	*-2.2*
Has become a parent or is pregnant	11.1	10.8	0.4	3.6	*0.5*
Has been expelled from school	3.9	6.0	-2.1	-35.5	*-2.6*
Has come to school high on drugs or alcohol	8.4	8.7	-0.3	-3.6	*-0.4*
Has been arrested	5.3	5.2	0.1	1.8	*0.1*
Sample size (N=755)	407	348			

SOURCE: See Table 3.4.

NOTES: See Table 3.4.

E. Impacts on Plans and Steps Taken Toward Post-Secondary Education and Work

Table 3.15 presents findings on the Career Academies' impacts on the medium-risk subgroup's plans and preparation for post-secondary education and work. As with many outcomes discussed in this section, the table indicates that in the medium-risk subgroup there was no systematic difference between Academy and non-Academy students in terms of their plans and preparation for post-secondary education and work.

Table 3.15

Career Academies Evaluation

Impacts on Planning and Preparation for College and Work for Students in the Medium-Risk Subgroup

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Plans for next year (%)					
School only	8.3	8.9	-0.7	-7.4	*0.8*
Work only	4.8	5.1	-0.3	-5.5	*0.3*
Combine school and work	83.9	83.9	0.1	0.1	*0.1*
Unknown	3.0	2.1	0.9	41.8	*1.1*
Steps taken toward 2-year or 4-year college admission					
Researched college options[c]	87.1	85.7	1.4	1.6	*1.7*
Took SATs or ACTs	44.3	46.9	-2.5	-5.4	*3.1*
Submitted an application	62.6	63.1	-0.5	-0.7	*0.6*
Had an interview	24.3	25.6	-1.3	-5.0	*1.6*
Steps taken toward post-secondary employment (%)					
Talked with a teacher or advisor about a job	39.1	40.9	-1.8	-4.4	*2.2*
Submitted an application for employment	60.7	55.4	5.3	9.5	*6.4*
Interviewed for a position	42.1	41.9	0.2	0.6	*0.3*
Has previous work experience with prospective employer	30.8	26.8	4.0	14.9	*4.9*
Education expectations (%)					
Complete some post-secondary education	93.6	93.9	-0.3	-0.3	*0.3*
Attend college	81.4	81.2	0.2	0.3	*0.3*
Graduate from college	63.4	66.2	-2.8	-4.2	*3.4*
Has overall positive outlook for the future[d]	75.1	78.5	-3.4	-4.4	*4.2*
Sample size (N=755)	407	348			

SOURCE: See Table 3.5.

NOTES: See Table 3.5.

V. Career Academy Impacts Averaged Across the Student Subgroups

As noted earlier, most previous studies of Career Academies have focused on findings that are averaged across the diverse groups of students they serve. To provide a sense of how the findings for these Career Academies might compare with other such averages, this section summarizes impact findings for the full study sample. A key conclusion from this analysis is that these overall averages mask a great deal of variation in the potential that Academies have to make a difference for students, particularly for students at risk of school failure.

Table 3.16 lists key outcomes that were discussed in previous sections of the chapter. In general, the pattern of impacts is consistent with the pattern seen in the subgroups, although the

Table 3.16

Career Academies Evaluation

Impacts on Selected High School Outcomes for Students in the Study Sample

Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[a]	*Impact per Enrollee*[b]
Ever enrolled in a Career Academy during high school (%)	88.5	6.8	81.7 ***		
Dropped out of high school before the end of grade 12 (%)	10.1	12.4	-2.4	-19.0	-2.9
Total course credits meet the graduation requirement (%)	64.8	58.8	6.0 **	10.2	7.3
English (4), Social Studies (3), Math (2), Science (2)[c] (%)	47.8	46.3	1.4	3.1	1.8
English (4), Social Studies (3), Math (3), Science (3)[c] (%)	28.4	26.7	1.7	6.3	2.1
Reading achievement test score average national percentile[d]	31.2	32.9	-1.7	-5.3	-2.1
Math achievement test score average national percentile[d]	29.9	29.4	0.5	1.7	0.6
Reported any positive youth development experiences in past year (%)[e]	71.6	67.4	4.2 *	6.2	5.1
Reported any risk-taking behaviors in past year (%)[f]	24.2	26.6	-2.4	-8.9	-2.9
Submitted application for 2- or 4-year college	62.0	60.2	1.8	3.0	2.2
Submitted application for post-secondary employment (%)	59.4	55.8	3.6	6.5	4.4
Sample size (N =)					

(continued)

Table 3.16 (continued)

SOURCES: MDRC calculations from Career Academies Evaluation Student School Records, 12th Grade Achievement Test, and 12th Grade Survey Databases.

NOTES: Credits include zero values for grades in which sample members were identified as school dropouts. Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences. All measures indicate credits earned up until the end of the 12th-grade year. 12th-grade year indicates the year that students were projected to reach the 12th-grade when they initially enrolled in the Career Academy or regular high school program.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. In both cases, statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]Percent change is defined as the impact divided by the non-Academy group average.

[b]Impact per enrollee is defined as the impact divided by the difference in the percentage of Academy and non-Academy group members ever enrolled in a Career Academy. It is italicized because its calculation does not involve a direct comparison of Academy and non-Academy students.

[c]Numbers refer to the amount of credits that were earned in each subject area.

[d]The reading and math achievement tests are the cognitive battery tests of reading and mathematics used in the NELS: 88 study. There were a total of five proficiency levels for mathematics and three for reading. Particular proficiency levels are reported in the table to illustrate general trends in performance in the distribution of students. Percentile scores reflect students' performance in relation to a nationally representative sample of 12th-graders.

[e]Students reported one or more of the positive youth development submeasures.

[f]Students reported one or more of the risk-taking behaviors submeasures.

magnitude of impacts for the full study sample is smaller. On average, across all the participating students and sites, the Academies produced increases in credits earned toward graduation, particularly in career-related and vocational courses. They also increased students' exposure to positive youth development activities. Not surprisingly, the averaged impacts tend to look more like those for the medium-risk subgroup, the largest of the three.

VI. Conclusions

The evidence presented in this chapter suggests that the Career Academies have the strongest positive effects on the outcomes of students who begin high school at a high risk of school failure. The Academies reduce dropout rates, increase attendance, and increase credits earned in both academic and vocational subjects. They also appear to improve outcomes among students who are at low risk of school failure. Although these students are already highly engaged in school and are unlikely to drop out, the Academies appear to improve several outcomes, including the percentage of these students who earn enough credits to graduate on time. On the other hand, the Academies do not appear to have much effect on students in the medium-risk subgroup.

Importantly, although the estimates in this chapter are focused on individual subgroups, they are aggregated across all the sites in the study. To the extent that differences in the implementation of the Academy model affect the impact of the Career Academies, these estimates may

still mask important variation in the effects of Academies on students' performance, engagement, and achievement in high school. To pursue this issue, Chapter 4 explores the variation across sites in the implementation of the Academy model, and Chapter 5 explores the effect of this variation on the impact of Academies on student outcomes.

Chapter 4

Factors Associated with Student Outcomes and the Pattern of Career Academy Impacts

This chapter and Chapter 5 explore some potential pathways through which the core elements of the Career Academy approach may change students' educational and work-related outcomes. The findings from these chapters provide some further context for explaining and interpreting the pattern of impacts discussed in Chapter 3.

Section I of this chapter identifies several aspects of students' high school environments and experiences that are most strongly associated with positive outcomes that students may attain by the end of 12th grade. In particular, it examines students' perspectives on three school-related domains: the degree of interpersonal support they received from teachers and peers, the extent to which their classes included applied teaching and learning activities, and their level of exposure to career awareness and work-based learning activities. This analysis focuses on both Academy and non-Academy students to shed light on the relationship between these domains and students' level of school engagement through the end of 12th grade.

Section II of this chapter examines differences across the participating sites in the extent to which the Career Academies increased the level of interpersonal support, applied learning, and work-related learning activities available to students. This analysis shows that a subset of Academies represent a large contrast with their non-Academy environments, particularly in terms of the interpersonal supports they offer to students. Chapter 5 explores the extent to which these Academies produced a different pattern of impacts on student outcomes than Academies that represented less of a contrast from their non-Academy environments.

I. Potential Pathways to Positive Student Outcomes

As discussed in Chapter 1, the Career Academy approach has attracted a great deal of attention in recent years, in part because its core features offer direct responses to a variety of problems that have been identified in high schools. Figure 1.1 provided a conceptual model showing the potential pathways through which these features may affect student outcomes in ways that are consistent with the broad range of goals that have been ascribed to Career Academies. Analyses conducted earlier in the Career Academies Evaluation, and updated for this report, provide empirical support for the conceptual framework illustrated in Figure 1.1. This section of the chapter briefly reviews the general findings from these analyses.[1]

Recall that the conceptual model listed four groups of constructs leading from the core elements of the Academy approach to various short- and long-term outcomes. The four sets of constructs are:

[1] See Kemple 1997a, 1997b; and Kemple, Poglinco, and Snipes, 1999.

- **Career Academy organizational elements** that distinguish the Academy approach from the regular high school environment in which it is implemented;
- **supports and learning opportunities** that are intended to evolve from the organizational elements;
- **high school outcomes** that the Academies aim to improve by enhancing the supports and learning opportunities; and
- **post-secondary outcomes** that reflect some of the long-term goals of the Academy approach.

Analyses conducted for previous reports from this evaluation and updated for the current report have focused on testing the correlation between measures of constructs indicated in the second column of Figure 1.1 and measures of the outcomes indicated in the third column. In other words, the analyses have explored empirical relationships between supports and learning opportunities and the outcomes students attain during high school.

One strand of analysis has examined the relationships between supports and outcomes for all students in the study sample, regardless of whether they had access to an Academy. This has been aimed at addressing such questions as whether students who experience higher levels of interpersonal support from teachers and peers are more likely to remain enrolled and engaged in school than students who experience lower levels of such supports. In fact, survey data collected for the evaluation indicate that students who reported receiving a high degree of support from their teachers and peers during 9th and 10th grades were less likely to drop out of high school and more likely to complete a core curriculum.[2] Similarly, students who participated intensively in career awareness and work-based learning activities tended to be more engaged in school and were more likely to be prepared to graduate and go on to college than those who did not participate in such activities or participated less intensively.[3] Finally, the analyses indicated a positive, yet weaker, association between students' exposure to integrated and applied learning activities and their school engagement and performance. In general, however, the strongest associations have been found between the interpersonal supports (such as teachers' expectations and peer collaboration) and various measures of student performance and engagement in school.[4]

To the extent that such relationships exist, on average, for all students in the study sample, it is likely that these types of supports serve as key pathways through which the Career Academies improve student engagement in school. As noted earlier, this is because the supports and learning opportunities are closely aligned with the organizational features of the Academy approach. For example, enhanced interpersonal support is likely to evolve from the intensive interaction and col-

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[2]These supports included students' perceptions of the personalized attention they receive from teachers, teachers' expectations for student performance and achievement, engagement levels of classmates, and opportunities to work closely with classmates.

[3]This finding should be interpreted with some caution because participation in these activities typically occurred after 11th grade. Some Career Academies, as well as other high school programs, tended to select students for their intensive career awareness and work-based learning activities based on students' level of engagement and performance in school. As a result, a high degree of school engagement may lead to higher levels of participation in career awareness and work-based learning activities, rather than the other way around.

[4]For additional information on these analyses, please contact the authors.

laboration offered by the school-within-a-school. A more focused curriculum and enriched teaching and learning are intended to develop through the Academy's integration of academic and occupational content. Greater exposure to career awareness and work-based education is promoted through the employer partnerships.

In fact, as discussed in the previous reports from this evaluation, Academy students were considerably more likely to experience the types of support and learning opportunities listed in Figure 1.1 than were their non-Academy counterparts in the study. It should be noted, however, that Career Academy impacts on supports and learning opportunities may not directly cause any of the impacts on such outcomes as dropout rates and credits earned toward graduation. Although these linkages make sense from an conceptual standpoint, it may be that the students who experienced the greatest increase in supports are different from the students who experienced the largest reductions in dropout rates or the greatest increases in credits earned. This suggests that the Career Academy impacts may follow from pathways other than those leading through the types of supports and learning opportunities listed in Figure 1.1.

One way to further test these relationships is to identify subgroups of sites in the study where the Career Academies generated particularly large increases in the supports and learning opportunities listed in Figure 1.1. The next step would be to determine whether the Academies in these sites also generated larger impacts on such outcomes as dropout rates and progress toward graduation. The next section of the chapter summarizes analyses that identify a group of sites that represented a particularly dramatic contrast with their non-Academy environments, at least in terms of the supports and learning opportunities discussed above.

II. Sources of Variation Among the Sites That May Be Associated with Differences in Impacts

The primary focus of this report is on the *difference* between Academy and non-Academy environments and on the effects that this difference may have on students' experiences and behaviors. As discussed in previous reports and earlier in this report, all the Career Academies had implemented the core features of the Academy approach and represented a clear contrast with the non-Academy environments in their schools. This section of the report begins an exploration of whether some versions or contexts for the Academy approach produce larger impacts on student outcomes than others.

As noted above and in previous reports from this study, the sites participating in the Career Academies Evaluation differ from one another along a number of dimensions.[5] As a result, there are numerous characteristics or criteria that might be used to differentiate the sites. For the purposes of this report, the strategy for exploring cross-site variation in the impacts of Career Academies focuses on similarities and differences among sites in terms of the *contrast* between their Academy and non-Academy environments, as opposed to exploring variation only on the basis of differences among the Career Academy programs. For example, some Career Academies with highly supportive school-within-a-school environments are located in high schools where the vast majority of students feel safe, challenged, and supported by their

[5]See Kemple and Rock, 1996, for more detailed information about the similarities and differences among sites.

teachers and peers. In such a context, the Academies may not add much to the high degree of support already offered by the non-Academy environment.

Conversely, other Academies are located in high schools where very high percentages of students do not receive the support or instruction required to keep them engaged in school and on a path toward graduation. Even though these Academies may not be as "well implemented" as Academies in other contexts, they provide much more support and challenge for their students than is available in the non-Academy environments.

The strategy used in this report to highlight contrasts among the participating sites was guided by the theory of change described in Chapter 1 and by analyses of the relationships among the key constructs described above. As noted earlier, interpersonal supports were found to have the strongest relationship with later outcomes such as dropout prevention and progress toward graduation. In other words, students who reported a high degree of support from their teachers and peers in 9th or 10th grade were more likely, by the end of 12th grade, to remain enrolled in high school, to have high attendance rates (95 percent or higher), and to have completed a core curriculum. In general, Career Academy students were more likely to experience high levels of interpersonal supports than their counterparts in non-Academy environments.

Given the strong association between interpersonal supports and later outcomes, the primary construct used to distinguish among sites in the study was the *difference* in the level of interpersonal supports that Academy and non-Academy students received. In short, individual sites were ranked according to the difference between the percentage of Academy and non-Academy students who reported receiving a high level of support from teachers and peers. Such ranking indicated that a subset of five participating sites showed a particularly large difference in the interpersonal supports of Academy and non-Academy students. Moreover, as a group, these sites generated larger differences in the school experiences of Academy and non-Academy students along several other important dimensions. Therefore, throughout the report, the Career Academies in these sites are referred to as *high-contrast Academies*.[6] The remaining sites showed a substantially smaller difference in the level of teacher and peer support reported by Academy and non-Academy students, as well as somewhat smaller differences along other dimensions of the high school experience. The Career Academies in these sites are referred to as *low-contrast Academies*.

Table 4.1 lists a variety of measures that highlight some of the key differences between high- and low-contrast sites and their Career Academies.[7] The first row in Table 4.1 shows the average percentages of Academy and non-Academy students who gave a high rating on an overall measure of teacher support. The left panel of the table shows the differences in these percentages for the high-contrast Academies, and the right panel shows the differences for the low-contrast Academies. The difference in this outcome was much larger for the high-contrast

[6]It is important to note that high-contrast Academies are not necessarily the most highly supportive or best-implemented Academies in the study. Rather, they are the sites where the Career Academies presented the greatest contrast with their non-Academy school environments according to the student survey data collected for the evaluation. In some low-contrast sites, a high percentage of Academy students reported receiving high levels of support from teachers and peers, but they are characterized as "low-contrast" sites because equally high or higher percentages of non-Academy students also reported receiving high levels of support.

[7]For a detailed description of the measures presented in Table 4.1, see Kemple, 1997a, 1997b; and Kemple, Poglinco, and Snipes, 1999.

Table 4.1

Career Academies Evaluation

Students' Perceptions of Interpersonal and Instructional Supports and Participation in Work-Related Activities, by High-Contrast and Low-Contrast Academies

Outcome	High-Contrast Academies[a]				Low-Contrast Academies[a]				
	Academy Group	Non-Academy Group	Impact	Percent Change[b]	Academy Group	Non-Academy Group	Impact	Percent Change[b]	
Students who gave a high rating on overall measure of teacher support	67.9	47.8	20.1 ***	42.1	51.1	46.6	4.5	9.6	†††
Students who gave a high rating on overall measure of peer support	54.0	39.7	14.3 ***	36.0	49.5	46.7	2.8	5.9	††
Students who gave a high rating on parent involvement	54.6	45.1	9.5 **	21.0	52.5	47.3	5.2	11.0	
Students who reported a high degree of exposure to enriched classroom instruction	63.4	44.2	19.3 ***	43.6	51.9	50.8	1.2	2.3	†††
Students who reported a high degree of exposure to work-related learning activities	54.7	33.3	21.4 ***	64.4	52.4	34.3	18.1 ***	52.9	
Students who reported intensive participation in career awareness and development activities in and outside school	60.9	42.2	18.8 ***	44.5	62.9	47.7	15.2 ***	31.9	
Students who reported working at a job with high-quality learning opportunities	47.3	41.2	6.2	15.0	50.8	45.9	4.9	10.8	
Sample size	328	233			394	328			

(continued)

Table 4.1 (continued)

SOURCES: MDRC calculations from Career Academies Evaluation Student School Experience Questionnaire Database and 12th Grade Survey Database.

NOTES: Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences.

A two-tailed t-test was applied to differences between the program and control groups. In both cases, statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]High-contrast Academies are defined as Academies that produced a significant difference in the percentage of Academy and non-Academy students who reported a high level of support from teachers and peers. Low-contrast Academies are defined as Academies that produced very little difference between the percentage of Academy and non-Academy students who reported a high level of support from teachers and peers.

[b]Percent change is defined as the impact divided by the non-Academy group average.

Academies, where there was a 20 percentage point difference between Academy and non-Academy students. This represents an increase of 42 percent in the proportion of Academy students who felt that they received a high degree of support from their teachers. For the low-contrast Academies, there was no statistically significant difference between the percentages of Academy and non-Academy students who indicated that they received a high degree of support from their teachers.

The first row of Table 4.1 further indicates that the contrast between the two groups of sites can be attributed mostly to differences between the Academy groups rather than to differences between the non-Academy groups. In the high-contrast sites, 68 percent of the Academy students reported receiving a high level of teacher support, compared with 51 percent of the Academy students in the low-contrast sites. On the other hand, very similar percentages of the non-Academy students from both groups of sites reported that they received a high level of teacher support. This pattern suggests that a key difference between these two groups of sites reflects differences among Academy implementation strategies or differences among Academy teachers (or, more likely, a combination of the two). There is little contrast — at least on this measure — in the non-Academy environments.

The second row of Table 4.1 indicates a somewhat different pattern with respect to peer support. Again, there is a clear contrast in the difference in peer support reported by Academy and non-Academy students across the two groups of sites. In this case, however, the difference across the two groups of sites is driven both by differences between Academy students *and* by differences between non-Academy students. Academy students in the high-contrast sites were more likely to give a high rating on peer support than were Academy students in the low-contrast sites. At the same time, non-Academy students in the high-contrast sites were less likely to give a high rating on peer support than were non-Academy students in the low-contrast sites.

What did the high-contrast Academies do that was different from the low-contrast Academies? In general, they tended to implement tightly organized school-within-a-school organizations. Programs in high-contrast Academies tended to include a core group of four or five teachers whose responsibilities fell exclusively within the Academy. The vast majority of students in these programs had their core courses scheduled in blocks within the Academy, and very few non-Academy students were included (except, for example, to ensure adequate enrollments).[8] These programs also tended to be located in a clearly identifiable area of the school building or campus. In addition, the Academy teachers in high-contrast sites tended to indicate that they had more opportunities to collaborate with colleagues, that they felt part of a strong learning community, that they were able to influence key areas of their work, and that they emphasized personalized attention to their students.[9]

It is important to note, however, that considerable variation existed among the Academies within the two groups of sites. In some sites, for example, the high contrast between the Academies and regular school environments appears to have stemmed from an advanced level of program implementation — a level that was closer to the ideal Academy model. In other cases, however, the high contrast appears to reflect that the regular high school environment was particularly stressful and unsupportive, and so the Academies provided considerably higher levels of

[8]See Kemple, 1997a, 1997b.

[9]This information comes from site visits, teacher interviews, and classroom observations completed as part of the Career Academies Evaluation.

support even though their programs were less well implemented than programs in other sites. In some high-contrast sites, a relatively low percentage of Academy students reported high levels of teacher and peer support, but an even lower percentage of non-Academy students did so.

There was also variation among the low-contrast sites. In some of them, relatively large percentages of both Academy and non-Academy students reported high levels of support from teachers and peers; in others, relatively small percentages did so. This suggests that, in some cases, the smaller effects on interpersonal support in the low-contrast sites were partly a function of weaker implementation of the Academy model. In other cases, however, the lack of effect was a function of the Academies' being implemented in environments that were already relatively supportive.

The remainder of Table 4.1 reveals that the two groups of sites differed along several other dimensions of the Academy experience, including students' exposure to enriched learning opportunities and participation in career awareness and work-based learning activities. In general, there were larger differences between the experiences of Academy and non-Academy students in the high-contrast sites than in the low-contrast sites. As discussed above and in Chapter 1, however, these constructs were not as strongly related to student engagement and performance. In addition, the variation within the two groups of sites was greater on these dimensions than on the interpersonal supports.

The analyses in Chapter 5 focus primarily on the differences in impacts between these two groups of sites. In general, the chapter explores the hypothesis that the high-contrast Academies produced larger impacts on student engagement and performance than the low-contrast Academies.

Chapter 5

The Relationship Between Career Academy Implementation and Impacts

This chapter explores the relationship between variation in Career Academy implementation across the sites in the study and variation in the impacts the different Academies had on student outcomes. In particular, this chapter explores the extent to which the pattern of impacts discussed in Chapter 3 differed across the high- and low-contrast sites identified in Chapter 4. Chapter 3 found that the positive effects of Career Academies were concentrated among students at a high risk of dropping out but that impacts were relatively modest among students who were not at such risk. The findings in Chapter 4 revealed that outcomes were strongly related to measures of the interpersonal support that students experienced in their school environments; the Academies in this evaluation substantially varied in the magnitude of *contrast* between the level of interpersonal support experienced by Academy students and the level experienced by non-Academy students in the regular high school environment.

In short, this chapter explores the hypothesis that Academies which represented the most dramatic contrast with their non-Academy environments produced larger and more consistent positive impacts than did Academies that were more similar to their non-Academy environments. Following is a summary of key findings discussed in this chapter.

- Among students in the medium-risk subgroup, Career Academies that represented the greatest contrast with the regular high school environment produced positive impacts, including lower dropout rates and increased completion of a core academic curriculum.

- Academies that represented less contrast with the non-Academy environment in terms of interpersonal support produced some negative effects for students in the medium-risk subgroup, including higher dropout rates, reduced attendance, and lower rates of academic course-taking.

- In general, both high-contrast and low-contrast Academies produced similar patterns of impacts among students in the high-risk subgroup. The primary difference across these sites is that the low-contrast Academies somewhat reduced this subgroup's dropout rates and produced much larger increases in vocational and career-related course-taking.

- In general, both high-contrast and low-contrast Academies also produced similar patterns of impacts among students in the low-risk subgroup. The primary difference across the sites for this subgroup is that the low-contrast Academies somewhat increased career-related and vocational credits while reducing academic course-taking.

In sum, these findings do not clearly support the hypothesis that the high-contrast Academies produced larger and more consistently positive impacts than the low-contrast Academies. Although this pattern can be seen among students in the medium-risk subgroup, for

the high- and low-risk subgroups the impacts across the groups of sites had more similarities than differences. Nevertheless, the differences that do exist suggest two implications:

- Increasing the level of interpersonal support for students — in addition to offering more opportunities to participate in career awareness and work-based learning activities — can produce a consistent pattern of positive effects for both the high- and the medium-risk subgroups (representing approximately 75 percent of the students Academies serve). Under such circumstances, students in the low-risk Academy group are likely to do at least as well as their non-Academy counterparts.

- If Academies do not increase the level of interpersonal support (again, relative to the regular school environment), they may actually reduce engagement among the medium-risk subgroup, and they may also lead the low-risk subgroup to replace some academic courses with career-related or vocational courses.

These findings and implications are discussed in greater detail below.

I. Contrasting Impacts for Students in the Medium-Risk Subgroup

Tables 5.1 and 5.2 report the impacts among students in the medium-risk subgroup (that is, students who were not identified as being at a particularly high or low risk of dropping out). The left panel of each table presents findings for the high-contrast Academies, and the right panel presents findings for the low-contrast Academies.[1]

The findings in the left panel of Table 5.1 indicate that, among students in the medium-risk subgroup, the high-contrast Academies had a positive impact on a number of key outcomes. In particular, the high-contrast Academies appeared to reduce dropout rates and increase the percentage of students who completed a core academic curriculum. Specifically, the high-contrast Academies reduced dropout rates for the medium-risk subgroup from 11 percent among non-Academy students to 5 percent among their Academy group counterparts. This 6 percentage point difference represents a 54 percent reduction in the dropout rate for non-Academy students in the medium-risk subgroup. In addition, the high-contrast Academies increased the percentage of the medium-risk subgroup who completed a basic core academic curriculum. Whereas 49 percent of non-Academy students in these sites completed the curriculum, 58 percent of Academy students did so.

The right panel of Table 5.1 indicates that impacts at the low-contrast Academies occurred in the opposite direction from impacts at the high-contrast Academies. In particular, the

[1] In addition to providing statistical significance tests of the impacts within each group of sites, the tables in this chapter provide statistical significance tests of the *difference* in impacts across the two groups of sites. The dagger symbols (†) in the rightmost column of each table indicate whether or not the impact for the high-contrast Academies was statistically significantly different from the impact observed for the low-contrast Academies. If a difference in impacts is statistically significant, one may have greater confidence that it is a systematic difference between the groups of sites and does not arise merely from chance.

Table 5.1

Career Academies Evaluation

Impacts on Enrollment, Attendance, and Course-Taking for Students in the Medium-Risk Subgroup, by High-Contrast and Low-Contrast Academies

	High-Contrast Academies[a]					Low-Contrast Academies[a]					
Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	
Ever enrolled in a Career Academy during high school (%)	85.8	6.5	79.3 ***			92.2	6.9	85.3 ***			
Dropped out of high school before the end of grade 12 (%)	5.3	11.3	-6.1 **	-53.5	*-7.7*	12.6	4.8	7.8 ***	*161.0*	9.1	†††
Average attendance grades 9-12 (%)	87.5	85.7	1.7	2.0	*2.2*	89.5	93.4	-3.9 ***	*-4.2*	-4.6	†††
Total course credits meet the graduation requirement (%)	68.4	61.5	6.9	11.2	*8.6*	61.6	68.6	-7.0	*-10.2*	-8.2	†
English (4), Social Studies(3), Math (2), Science (2)[a] (%)	58.0	48.5	9.4 *	19.5	*11.9*	37.2	54.2	-17.0 ***	*-31.4*	-19.9	†††
Earned 2 or more foreign-language credits	54.5	48.6	5.9	12.1	*7.4*	25.7	49.8	-24.1 ***	*-48.4*	-28.2	†††
Earned 3 or more career/vocational credits	61.5	49.9	11.6 **	23.3	*14.6*	72.0	45.7	26.2 ***	*57.4*	30.8	†
Sample size	195	165				198	166				

(continued)

Table 5.1 (continued)

SOURCE: MDRC calculations from Career Academies Evaluation School Records Database.

NOTES: Attendance rates include zero values for grades in which sample members were identified as school dropouts. Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

An f-test was performed to determine whether the variation in impacts across site-subgroups was statistically significant. Statistical significance of these tests are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

[a]High-contrast Academies are defined as Academies that produced a significant difference in the percentage of Academy and non-Academy students who reported a "high" level of support from their teachers and peers early on in high school. Low-contrast Academies are defined as Academies that produced very little difference between the percentage of Academy and non-Academy students who reported a "high" level of support from teachers and peers.

[b]Percent change is defined as the impact divided by the non-Academy group average.

[c]Impact per enrollee is defined as the impact divided by the difference in the percentage of program and control group members ever enrolled in a Career Academy.

[d]Numbers refer to the amount of credits that were earned in each subject area.

low-contrast Academies appear to have *increased* dropout rates for the medium-risk subgroup, from 5 percent among the non-Academy students to 13 percent among the Academy students. The dropout rate for Academy students in these sites was about two and a half times larger than it was for their non-Academy counterparts. Furthermore, while neither group of Academies produced statistically significant changes in the percentage of students in the medium-risk subgroup who earned enough credits to graduate on time, the patterns of impacts run in opposite directions. That is, the high-contrast Academies increased the percentage of students who earned enough credits to meet the districts' graduation requirements, while the low-contrast Academies decreased this percentage. (Note that the difference in these impacts is statistically significant even though the individual impact estimates are not.)

There were particularly dramatic differences in impacts on course-taking patterns between the high-contrast and low-contrast Academies. The low-contrast Academies reduced the percentage of students in the medium-risk subgroup who completed the basic core academic curriculum, from 54 percent for students in the non-Academy group to 37 percent for students in the Academy group. A similar reduction occurred in the percentage of students who completed two or more foreign-language courses (from 50 percent for the non-Academy group to 26 percent for the Academy group).

The last row of Table 5.1 indicates that the low-contrast Academies produced more than twice as large an impact on vocational course-taking than did the high-contrast Academies. Specifically, in the high-contrast Academies, the percentage of students in the medium-risk subgroups who completed three or more career-related or vocational courses increased from 50 percent for the non-Academy group to 62 percent for the Academy group. This 12 percentage point difference represents an increase of about 23 percent over the non-Academy group average. In the low-contrast Academies, however, the percentage of students who completed three or more career-related or vocational courses increased from 46 percent for the non-Academy group to 72 percent for the Academy group — an increase of 57 percent over the non-Academy group average.

Table 5.2 presents the impacts of each group of Academies on the medium-risk subgroup's youth development activities and the steps these students took toward post-secondary education or employment opportunities. The primary differences between the two groups of sites relate to the steps students took toward employment. The high-contrast Academies slightly reduced the percentages both of students who applied for post-secondary employment and of students who interviewed for a position, whereas the low-contrast Academies had significant positive impacts on both outcomes.

Although the two groups of sites were differentiated by the level of interpersonal support that the Academies offered to students (relative to the non-Academy environment), it is notable that several differences in impacts relate to curriculum and work-related activities. The patterns of findings presented in Tables 5.1 and 5.2 suggest that the low-contrast Academies placed greater emphasis on career-related and vocational course-taking and on helping students take concrete steps toward post-secondary employment opportunities. Nonetheless, the high-contrast Academies do appear to have produced stronger impacts on school engagement for students in the medium-risk subgroup.

Table 5.2

Career Academies Evaluation

Impacts on Youth Development Experiences and Preparation for the Future for Students in the Medium-Risk Subgroup, by High-Contrast and Low-Contrast Academies

	High-Contrast Academies[a]					Low-Contrast Academies[a]				
Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]
Reported two or more positive youth development experiences in past year (%)[d]	73.3	66.1	7.3	11.0	*9.2*	69.3	72.3	-3.0	-4.2	*-3.5*
Reported any risk-taking behaviors in past year (%)[e]	24.9	25.7	-0.8	-3.0	*-1.0*	22.7	25.7	-3.1	-11.9	*-3.6*
Took steps toward 2-year or 4-year college admission (%)										
Took SATs or ACTs	46.3	48.7	-2.4	-5.0	*-3.0*	42.7	45.3	-2.6	-5.7	*-3.0*
Submitted an application	67.9	63.2	4.7	7.4	*5.9*	57.8	63.1	-5.2	-8.3	*-6.2*
Took steps toward post-secondary employment (%)										
Submitted an application for employment	59.7	63.2	-3.5	-5.6	*-4.5*	62.1	48.0	14.1 ***	29.4	*16.5* ††
Interviewed for a position	41.5	50.3	-8.8 *	-17.5	*-11.1*	43.1	33.9	9.1 *	26.9	*10.7* ††
Has an overall positive outlook for the future[f]	74.4	73.6	0.8	1.0	*1.0*	75.8	82.9	-7.1 *	-8.6	*-8.3*
Sample size	191	161				216	187			

(continued)

Table 5.2 (continued)

SOURCE: MDRC calculations from Career Academies Evaluation 12th Grade Student Survey Database

NOTES: Attendance rates include zero values for grades in which sample members were identified as school dropouts. Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. Statistical significance levels are indicated as: *** = 1 percent; ** = 5 percent; * = 10 percent.

An f-test was performed to determine whether the variation in impacts across site-subgroups was statistically significant. Statistical significance of these tests are indicated as: ††† = 1 percent; †† = 5 percent; † = 10 percent.

[a]High-contrast Academies are defined as Academies that produced a significant difference in the percentage of Academy and non-Academy students who reported a "high" level of support from their teachers and peers. Low-contrast Academies are defined as Acadmies that produced very little difference between the percentage of Academy and non-Academy students who reported a "high" level of support from teachers and peers.

[b]Percent change is defined as the impact divided by the non-Academy group average.

[c]Impact per enrollee is defined as the impact divided by the difference in the percentage of program and control group members ever enrolled in a Career Academy.

[d]Positive youth development experiences include working on a volunteer project in the community, receiving an award or recognition for participation in an athletic team or school organization, or receiving an academic award or scholarship.

[e]Risk-taking behaviors include being expelled from school, coming to school high on drugs or alcohol, or being arrested.

[f]Overall positive outlook for the future was defined by high ratings on questions about expectations for achievement, potential for attaining jobs, and knowledge of methods of finding jobs.

II. Contrasting Impacts for Students in the High-Risk Subgroup

Tables 5.3 and 5.4 present the impact findings for the high-risk subgroup. These findings indicate that the patterns of impacts across the high-contrast and low-contrast Academies are generally similar. Both groups of Academies had positive effects on dropout rates, attendance, credits earned toward graduation, and completion of a core academic curriculum. With the exception of the impacts on career-related and vocational course-taking, none of the differences in impacts across the site groups is statistically significant.[2]

There are two notable exceptions to the pattern of similar impacts for students in the high-risk subgroups across the sites. First, although both groups of Academies produced reductions in dropout rates, the impact on dropout rates for the high-contrast Academies was not statistically significant. (Note that the differences in dropout rate impacts across the groups of sites is not statistically significant.) In particular, the low-contrast Academies cut dropout rates in half for the high-risk subgroups, while the high-contrast Academies reduced dropout rates by about 25 percent. There is no clear explanation for this pattern of findings, and it runs counter to the hypothesis that increased interpersonal support in the high-contrast sites should have produced larger reductions in dropout rates.

Despite the somewhat smaller impact on dropout rate reduction, however, Table 5.3 shows that the high-contrast Academies produced comparable impacts on attendance and credits. For example, the high-contrast Academies increased the percentage of the high-risk subgroup who earned sufficient credits to graduate, from 30 percent for the non-Academy students to 43 percent for the Academy students. A similar pattern occurred among the low-contrast Academies. Whereas 19 percent of the high-risk non-Academy group at the low-contrast sites earned enough credits to graduate by the end of 12th grade, 36 percent of their peers in the Academy group did so — a difference of 87 percent. Again, although this impact appears to be somewhat larger among the low-contrast Academies, the difference in impacts is not statistically significant.

Both high-contrast and low-contrast Academies increased the percentage of the high-risk subgroup who completed the basic core academic curriculum. Again, while this impact is statistically significant only in the high-contrast sites, there is no significant difference across the sites in the magnitude of this impact. In fact, to the extent that there is a difference, the percentage change at the low-contrast sites appears to be larger than at the high-contrast sites.

As noted above, vocational or career-related course-taking reflects the only dimension along which the difference in impacts across sites is statistically significant. While the impact on the percentage of students who took three or more vocational courses is significant for both high-contrast and low-contrast Academies, the impact on vocational course-taking is substantially larger for low-contrast Academies. At these sites, 28 percent of the high-risk non-Academy group completed at least three career-related or vocational courses, compared with 66 percent of the Academy group. This impact represents an increase of 141 percent over the non-Academy group and is nearly four times larger than the impact for the high-contrast Academies. This suggests that while the high-contrast and low-contrast Academies produced

[2]In other words, one cannot reject the hypothesis that the impacts for high-contrast Academies are the same as the impacts for low-contrast Academies.

Table 5.3

Career Academies Evaluation

Impacts on Enrollment, Attendance, and Course-Taking for Students in the High-Risk Subgroup, by High-Contrast and Low-Contrast Academies

Outcome	High-Contrast Academies[a]					Low-Contrast Academies[a]					
	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	
Ever enrolled in a Career Academy during high school (%)	86.2	4.4	81.8 ***			87.5	0.4	87.1 ***			
Dropped out of high school before the end of grade 12 (%)	24.2	32.0	-7.9	-24.6	*-9.6*	16.2	34.4	-18.2 **	-52.9	*-20.9*	
Average attendance grades 9-12 (%)	79.0	73.5	5.5 **	7.5	*6.7*	85.3	78.7	6.6 **	8.4	*7.6*	
Total course credits meet the graduation requirement (%)	43.4	30.2	13.1 *	43.5	*16.1*	35.8	19.1	16.6 **	87.0	*19.1*	
English (4), Social Studies(3), Math (2), Science (2)[d] (%)	36.1	19.6	16.5 **	84.4	*20.2*	20.9	8.9	12.0	134.6	*13.8*	
Earned 2 or more foreign-language credits (%)	29.4	21.4	8.0	37.5	*9.8*	16.0	13.6	2.3	17.2	*2.7*	
Earned 3 or more career vocational credits (%)	55.3	40.3	15.0 *	37.2	*18.3*	66.3	27.5	38.8 ***	140.8	*44.5*	†
Sample size	103	94				82	66				

SOURCE: See Table 5.1.

NOTES: See Table 5.1.

Table 5.4

Career Academies Evaluation

Impacts on Youth Development Experiences and Preparation for the Future for Students in the High-Risk Subgroup, by High-Contrast and Low-Contrast Academies

	High-Contrast Academies[a]					Low-Contrast Academies[a]				
Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]
Reported two or more positive youth development experiences in past year (%)[d]	62.1	52.7	9.4	17.9	*11.5*	63.0	59.0	4.0	6.7	*4.6*
Reported any risk-taking behaviors in past year (%)[e]	34.3	45.2	-10.9	-24.1	*-13.3*	35.2	31.4	3.8	12.1	*4.4*
Took steps toward 2-year or 4-year college admission (%)										
Took SATs or ACTs	33.6	22.2	11.4 *	51.5	*14.0*	34.5	23.5	11.0	46.8	*12.6*
Submitted an application	47.5	35.5	12.0 *	33.7	*14.6*	53.5	35.7	17.8 **	50.0	*20.5*
Took steps toward post-secondary employment (%)										
Submitted an application for employment	61.7	60.9	0.8	1.3	*1.0*	59.9	48.4	11.5	23.8	*13.2*
Interviewed for a position	47.5	46.6	0.9	2.0	*1.1*	44.6	39.7	4.9	12.3	*5.6*
Has an overall positive outlook for the future[f]	75.8	66.8	9.0	13.5	*11.0*	69.7	63.3	6.5	10.2	*7.4*
Sample size	112	95				90	69			

SOURCE: See Table 5.2.

NOTES: See Table 5.2.

similar patterns of impacts on student engagement generally, the low-contrast Academies produced a much larger impact on career-related and vocational course-taking. It is important to note that, for the high-risk subgroup, this increase in career-related and vocational course-taking did not appear to result in a reduction in academic course-taking.

Table 5.4 presents the impacts for the high-contrast and low-contrast Academies on youth development outcomes and steps taken toward post-secondary education and employment. In general, the data suggest no real differences in impacts between the two groups of sites.

III. Contrasting Impacts for Students in the Low-Risk Subgroup

Table 5.5 presents the impact findings for the low-risk subgroups across the high-contrast and low-contrast Academies. Not surprisingly, the findings suggest that neither group of Academies had a meaningful impact on dropout rates or attendance. Students in the low-risk subgroup at both groups of sites were unlikely to drop out of high school and had relatively high attendance rates, even in the absence of the Academy treatment. Given these outcome levels, there was little opportunity for either group of Academies to make much difference.

Table 5.5 does show that both groups of Academies increased the percentage of the low-risk subgroup who earned enough credits to meet their districts' graduation requirements. The table indicates that, at the low-contrast sites, 75 percent of the non-Academy students earned enough credits by the end of their scheduled 12th-grade year, compared with 88 percent of the Academy students. Similarly, at the high-contrast sites, 73 percent of the non-Academy students earned enough credits to graduate on time, compared with 84 percent of the Academy students in the low-risk subgroup.

The last three rows of Table 5.5 show that the primary differences in impacts across the two groups of sites occurred in course-taking patterns. The low-contrast Academies reduced the percentage of students in the low-risk subgroup who completed the basic academic curriculum as well as the percentage who completed two or more foreign-language courses. On the other hand, the high-contrast Academies produced a slight increase in the percentage of students who completed the basic core curriculum and a smaller (not statistically significant) reduction in the percentage taking two or more foreign-language courses.

Table 5.5 indicates that, at the low-contrast sites, 64 percent of the non-Academy students in the low-risk subgroup completed the basic core academic curriculum. In comparison, 54 percent of Academy students did so. Although this difference is not statistically significant, it *is* significantly different from the pattern at the high-contrast sites, where the Academies *increased* by almost the same magnitude the percentage of students who completed the basic core curriculum.

Table 5.5 also indicates that the low-contrast Academies reduced the percentage of the low-risk subgroup who completed two or more foreign-language courses. While 79 percent of the non-Academy students at these sites earned two or more foreign-language credits, 44 percent of their Academy counterparts did so. This difference is statistically significant and represents a reduction of 44 percent. Although there is a negative effect on this outcome for the high-contrast sites, it is not statistically significant; moreover, it is substantially smaller than the effect at the low-contrast sites.

Table 5.5

Career Academies Evaluation

Impacts on Enrollment, Attendance, and Course-Taking for Students in the Low-Risk Subgroup, by High-Contrast and Low-Contrast Academies

	High-Contrast Academies[a]					Low-Contrast Academies[a]					
Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	
Ever enrolled in a Career Academy during high school (%)	82.6	6.9	75.7 ***			94.1	12.5	81.6 ***			
Dropped out of high school before the end of grade 12 (%)	2.4	4.3	-1.8	-42.9	*-2.4*	1.7	1.8	-0.1	-5.4	*-0.1*	
Average attendance grades 9-12 (%)	93.1	92.0	1.1	1.2	*1.5*	95.9	95.9	0.1	0.1	*0.1*	
Total course credits meet the graduation requirement (%)	83.7	72.8	10.9 *	15.0	*14.4*	87.9	75.1	12.7 **	16.9	*15.6*	
English (4), Social Studies(3), Math (2), Science (2)[c] (%)	64.6	55.7	8.9	16.0	*11.8*	53.8	64.4	-10.6	-16.5	*-13.0*	†
Earned 2 or more foreign-language credits	57.6	66.9	-9.3	-14.0	*-12.3*	44.1	79.2	-35.1 ***	-44.3	*-43.0*	††
Earned 3 or more career/vocational credits	72.8	44.3	28.5 ***	64.5	*37.7*	79.8	41.0	38.7 ***	94.4	*47.4*	
Sample size	85	69				119	112				

SOURCE: See Table 5.1.

NOTES: See Table 5.1.

Finally, while both groups of Academies increased the vocational course-taking for students in the low-risk subgroup, the impact at low-contrast sites was slightly larger. The high-contrast Academies increased the percentage of students who earned three or more career-related or vocational credits from 44 to 73 percent (an increase of 65 percent), whereas the low-contrast Academies increased this percentage from 41 to 80 percent (an increase of 94 percent).

Table 5.6 presents findings on the low-risk subgroup's youth development experiences and steps taken toward post-secondary education and employment. In general, there were few impacts on these outcomes and few differences in the patterns at high-contrast and low-contrast Academies. The one exception is the effect of Academies on positive youth development experiences. The first row of Table 5.6 presents the percentages of the low-risk subgroup who reported such positive youth development experiences as working on a volunteer project in their community, receiving an award or recognition for participating in an athletic team or school organization, and receiving an academic award or scholarship. Among the high-contrast Academies, 70 percent of the low-risk non-Academy group reported positive youth development experiences, compared with 84 percent of the Academy students. The low-contrast Academies did not have an impact on this outcome.

IV. Summary

The findings reported in this chapter have several implications for policy and practice. First, it appears that Academies which produced the largest increases in interpersonal supports for students (relative to their non-Academy environments) also produced positive impacts on student engagement among both the high-risk and the medium-risk subgroups (which represent about 75 percent of the students they serve). Thus, focusing on interpersonal supports appears to be a particularly important factor for both policymakers and practitioners when implementing Academies. As discussed in Chapter 4, such supports as increased teachers' expectations, personalized attention, and students' connections with an engaged peer group are most likely to be derived from the school-within-a-school component of the Academy approach. This component may be a necessary, though perhaps not sufficient, condition to keep students in school and to provide a foundation for improving their achievement.

Second, it appears that high-contrast and low-contrast Academies may differ in important ways other than in their levels of interpersonal support. This is suggested by the larger impacts that the low-contrast Academies had on career-related and vocational course-taking and by their reductions in academic course-taking, particularly among the medium-risk and low-risk subgroups. Given that completion of a core academic curriculum and foreign-language courses are often key requirements for admission to a four-year college, to the extent that the mission of the Academies has evolved to include preparation for work *and* college, it is important that the Academies avoid limiting opportunities for any subset of students. Therefore, policymakers and practitioners may need to ensure that Academies are implemented in a way that increases both interpersonal support and exposure to career-related themes and experiences in school but that does not limit students' opportunities to complete key academic courses.

Table 5.6

Career Academies Evaluation

Impacts on Youth Development Experiences and Preparation for the Future for Students in the Low-Risk Subgroup, by High-Contrast and Low-Contrast Academies

	High-Contrast Academies[a]					Low-Contrast Academies[a]					
Outcome	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	Academy Group	Non-Academy Group	Impact	Percent Change[b]	*Impact per Enrollee*[c]	
Reported two or more positive youth development experiences in past year (%)[d]	84.1	70.3	13.8 **	19.6	*18.2*	78.0	78.9	-0.9	-1.1	*-1.0*	†
Reported any risk-taking behaviors in past year (%)[e]	10.4	16.0	-5.6	-35.0	*-7.4*	19.5	15.7	3.8	24.3	*4.7*	
Took steps toward 2-year or 4-year college admission (%)											
Took SATs or ACTs	63.6	58.7	4.9	8.3	*6.4*	57.7	60.5	-2.8	-4.6	*-3.4*	
Submitted an application	73.0	81.5	-8.5	-10.5	*-11.3*	69.0	77.3	-8.3	-10.7	*-10.1*	
Took steps toward post-secondary employment (%)											
Submitted an application for employment	55.1	64.2	-9.1	-14.2	*-12.0*	56.4	51.9	4.5	8.7	*5.5*	
Interviewed for a position	33.8	32.8	1.0	2.9	*1.3*	41.7	42.8	-1.1	-2.6	*-1.3*	
Has an overall positive outlook for the future[f]	80.1	81.1	-1.0	-1.2	*-1.3*	76.9	76.8	0.1	0.1	*0.1*	
Sample size	90	64				128	107				

SOURCE: See Table 5.2.

NOTES: See Table 5.2.

Appendix A

Supplementary Information About the Career Academies Evaluation Research Sample and Data Sources

As discussed in Chapter 1, the primary data used in this report were obtained from three sources: school transcript records, a survey administered to students at the end of their 12th-grade year, and a standardized math and reading achievement test administered to a subsample of students at the end of their 12th-grade year. This appendix presents the percentage of students in the full study sample for whom these data are available. It also examines the comparability of students in the Academy and non-Academy groups for whom data are availabile.

I. Data Availability for Students in the Study Sample

As noted in Chapter 1, MDRC attempted to obtain data for a sample of 1,764 students from nine of the sites selected for the study.[1] For the purposes of this report, this group of students is referred to as the *study sample*. Of the students in the study sample, 959 (55 percent) were randomly selected to enroll in an Academy. For the purposes of this report, these students are referred to as the *Academy group*. The remaining 805 students (45 percent of the study sample) were not invited to participate in the Academies but could choose other options available in their high school or school district. These students constitute the study's control group and are referred to in this report as the *non-Academy group*.

These groups of students were identified over a three-year period including the 1992-93, 1993-94, and 1994-95 school years. The students in the study sample were identified at the end of their 8th- or 9th-grade year, depending on when they applied for an Academy program. Recall that two of the Academies began in the 9th grade and that the remaining seven began in the 10th grade. Students applied for admission to the programs at the end of the year prior to expected enrollment. This report follows students in the study sample through the end of the year they were scheduled to graduate from high school. This corresponds to the 1995-96, 1996-97, or 1997-98 school year, depending on the year and grade level when a student entered the study. In short, MDRC attempted to collect data for students over the four-year period they were scheduled to enroll in high school.

Table A.1 lists the percentages of students in the Academy and non-Academy groups for whom each of the key data sources is available. These percentages are referred to here as *response rates*. The top panel of the table shows the response rates for the full study sample, and the bottom three panels show the response rates for each of the three risk subgroups discussed throughout the report. Although not shown in the table, the overall response rates are as follows: Student School Records data are available for just over 82 percent of the students in the study sample, and 12th Grade Survey data are available for just over 85 percent of the study sample. These response rates

[1]As discussed in Kemple and Rock, 1996, the initial research sample consisted of 1,953 students from 10 sites. A total of 189 of these students were dropped from the initial research sample, and efforts to collect data for them were discontinued. These students include the following. First, as noted in Chapter 1, one of the initial Career Academies was disbanded after two years in the study and was unable to provide sufficient follow-up data for its students in the study sample. Thus, the 126 students in the research sample from this site are not included in the study sample for this report. Second, MDRC learned that 59 of the students in the initial research sample applied for an Academy program during their 10th-grade year and should not have been included in the study. This information was obtained from pre-random assignment school records and was confirmed with school staff. Finally, over the course of the data collection period, MDRC learned through contact with the schools and families that four additional students were deceased.

Table A.1

Career Academies Evaluation

Data Availability for the Full Study Sample and the Risk Subgroups

Subgroup and Data Source	Academy Group	Non-Academy Group	Difference
Full study sample			
In Student School Records Database (%)	81.5	83.5	-2.0
In 12th Grade Survey Database (%)	86.2	84.8	1.4
In 12th Grade Achievement Test Database[a] (%)	71.8	69.9	1.9
Sample size (n=1,764)	959	805	
High-risk subgroup			
In Student School Records Database (%)	71.7	74.1	-2.4
In 12th Grade Survey Database (%)	78.3	75.9	2.4
In 12th Grade Achievement Test Database[a] (%)	60.0	56.0	4.0
Sample size (n=474)	258	216	
Medium-risk subgroup			
In Student School Records Database (%)	83.4	83.2	0.2
In 12th Grade Survey Database (%)	86.4	87.4	-1.0
In 12th Grade Achievement Test Database[a] (%)	74.3	69.9	4.4
Sample size (n=869)	471	398	
Low-risk subgroup			
In Student School Records Database (%)	88.7	94.8	-6.1 *
In 12th Grade Survey Database (%)	94.8	89.5	5.3 *
In 12th Grade Achievement Test Database[a] (%)	80.0	84.8	-4.8
Sample size (n=421)	230	191	

SOURCES: MDRC calculations from Career Academies Evaluation Student Baseline Questionnaire Database, Student School Records Database, and 12th Grade Survey Database.

NOTES: The statistical significance of the difference between Academy and non-Academy groups is indicated as *** = 1 percent; ** = 5 percent; * = 10 percent.

[a]Percentages based on those attempted for the 12th-grade achievement test:

	Academy Group	Non-Academy Group
Full sample	372	319
High-risk subgroup	105	84
Medium-risk subgroup	167	156
Low-risk subgroup	100	79

are considered to be high, particularly given that they cover a four-year follow-up period. Typically, program evaluations such as this aim for response rates of 80 percent or higher. The 12th Grade Achievement Test data are available for approximately 71 percent of the students in the study sample who were attempted for the test administration.[2]

The top panel of Table A.1 shows that there are no systematic differences between the Academy and non-Academy groups in the proportion of students for whom these data are available. Thus, although these data are not available for all students in the study sample, data availability is virtually the same for the Academy and non-Academy groups. The second and third panels in the table show that there also are no systematic differences in response rates for each of the data sources for the high-risk and medium-risk subgroups.

There are slight differences in response rates, however, between Academy and non-Academy students in the low-risk subgroup. In particular, response rates for Student School Records data are somewhat higher among the students in the low-risk non-Academy group than they are for the students in the low-risk Academy group. Conversely, response rates for the 12th Grade Survey are somewhat higher among students in the low-risk Academy group. When response rates are larger for one research group, impact estimates may be biased slightly if there are systematic differences in background characteristics and pre-random assignment experiences between Academy and non-Academy students who did respond. As discussed in the next section of this Appendix, there are no systematic differences between Academy and non-Academy students in any of the subgroups for any of the data sources.

A key question for interpreting the findings presented in this report is whether students for whom data are available are representative of the full study sample. To address this question, multiple regression was used to determine the extent to which the average characteristics of the students with data differed from the average characteristics of students for whom data are not available. This analysis was carried out for each of the three data sources. In each case, the analysis indicated that there were systematic differences in background characteristics between students with data and those without data. An illustration of the differences can be seen by comparing the response rates of the high-risk, medium-risk, and low-risk subgroups in Table A.1. Across all three data sources, response rates are lowest for the students in the high-risk subgroup and are highest for students in the low-risk subgroup.

In short, the analysis of response rates indicates that the samples of students for whom data are available are not completely representative of the full study sample of 1,764 students. Thus, caution should be exercised when attempting to generalize the findings beyond the students who are included in the analyses. Nevertheless, the overall response rates show that data are available for the vast majority of students in the study sample, making the findings reflective of the behavior of most of the sample.

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[2]As noted in Chapter 1, MDRC attempted to administer the achievement test to the 691 students in the study sample who were scheduled to be in the 12th grade at the end of the 1997-98 school year.

II. Comparison of Characteristics of Academy and Non-Academy Groups in the Database Samples

The unique strength of a random assignment research design is that it yields two groups for which there are no systematic differences in measured and unmeasured background characteristics at the time sample members are identified for the study. Because the two groups entered the study with equivalent characteristics, any differences that emerge after that point can be attributed with confidence to the fact that one group had access to an Academy and the other group did not.

Table 2.1 in Chapter 2 presents, one at a time, average characteristics of Academy and non-Academy students in the full study sample. This table shows that there are not statistically significant differences between the groups on any of the characteristics. A more rigorous way to test for such differences is to use multiple regression analysis. Table A.2 presents linear regression estimates and statistical tests of whether there are any systematic differences between Academy and non-Academy students in the full study sample and in each of the three risk subgroups. The first column in Table A.2 shows that only one characteristic (age at application to Academy) is statistically significant and that there is no systematic difference. The final entry in the column, the p-value of the F-statistic, is very close to 1, providing strong evidence that there is no overall pattern of differences between Academy and non-Academy students in the full study sample. A p-value of .1 or lower is typically used to indicate a "high" likelihood that there are systematic differences between the groups.

The three remaining columns in Table A.2 present the same analysis for each of the three risk subgroups. These columns indicate that there are slight differences in a few individual characteristics but no overall pattern of differences between Academy and non-Academy students for any of the subgroups. The p-value of the F-statistic for each subgroup ranges from .767 to .879.

As discussed in the previous section of this appendix, MDRC obtained school records for approximately 82 percent of the full sample; obtained 12th Grade Survey data for approximately 84 percent of the full study sample; and obtained 12th Grade Achievement Test data for approximately 71 percent of those attempted for the test. Thus, the Student School Records Database sample consists of 1,454 students; the 12th Grade Survey Database sample consists of 1,510 students; and the 12th Grade Achievement Test Database sample consists of 490 students.

A key question underlying the analyses presented in this report is: Do these response patterns preserve the random assignment design? In other words, does each of the database samples exhibit the same lack of systematic differences between Academy and non-Academy students, both overall and for each of the risk subgroups? To assess this question, regression analyses were used in the same manner as exhibited in Table A.2. Table A.3 presents the results for the Student School Records Database sample; Table A.4 presents the results for the 12th Grade Survey Database sample; and Table A.5 presents the results for the 12th Grade Achievement Test Database sample.

These tables each indicate slight differences in a few particular characteristics, but there are no systematic differences between the Academy and non-Academy groups for any of the database samples. This is true for the full study sample and for each of the risk subgroups. Given the overall lack of differences in background characteristics between the two groups, one can be confident

that differences in the outcome measures used throughout the report were caused by one group's having had access to the Career Academies and the other group's not having had such access.

In summary, random assignment created two groups of students without systematic overall differences in background characteristics and prior school experiences. The pattern of response rates for each of the data sources preserves this feature of the research design. The lack of systematic differences between the Academy and non-Academy research groups is also preserved within each of the risk subgroups that are used throughout the report.

Table A.2

Career Academies Evaluation

Regression Coefficients for Probability of Being Assigned to the Academy Group for Full Study Sample and by Risk Subgroups

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
Intercept	0.047	-0.685	0.676	2.363
	(0.383)	(0.682)	(0.734)	(1.689)
Sites				
Site 1	-0.052	-0.277 **	0.114	-0.083
	(0.072)	(0.139)	(0.110)	(0.153)
Site 2	-0.071	-0.251 *	-0.004	-0.127
	(0.081)	(0.149)	(0.121)	(0.204)
Site 3	0.034	-0.132	0.028	0.022
	(0.093)	(0.199)	(0.134)	(0.237)
Site 4	-0.093	-0.207	-0.088	-0.019
	(0.091)	(0.157)	(0.138)	(0.284)
Site 5	-0.008	0.024	-0.032	-0.024
	(0.060)	(0.100)	(0.093)	(0.146)
Site 6	-0.011	0.000	0.085	-0.236 *
	(0.055)	(0.097)	(0.084)	(0.126)
Site 7	0.006	-0.086	0.056	0.045
	(0.047)	(0.086)	(0.071)	(0.103)
Site 8	0.023	-0.031	0.019	0.034
	(0.045)	(0.092)	(0.068)	(0.096)
Expected graduation year				
1996	0.018	-0.021	0.045	-0.038
	(0.038)	(0.082)	(0.055)	(0.080)
1997	0.015	-0.069	0.025	0.015
	(0.033)	(0.077)	(0.045)	(0.065)

(continued)

Table A.2 (continued)

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
In 8th grade at application to Academy	0.043	0.082	-0.023	0.192
	(0.076)	(0.136)	(0.109)	(0.212)
Female	-0.023	0.043	-0.051	-0.021
	(0.025)	(0.051)	(0.036)	(0.053)
Age at application to Academy	0.045 **	0.092 **	0.009	0.047
	(0.023)	(0.042)	(0.033)	(0.049)
Race/ethnicity				
Hispanic	0.032	0.147	-0.023	0.054
	(0.053)	(0.119)	(0.073)	(0.110)
African-American	0.104	0.251 *	0.015	0.132
	(0.068)	(0.141)	(0.099)	(0.142)
Asian/Native American	0.073	0.094	0.059	0.168
	(0.069)	(0.148)	(0.099)	(0.145)
Average 8th-grade math test percentile	0.000	0.000	-0.001	0.001
	(0.001)	(0.002)	(0.001)	(0.002)
Missing 8th-grade math test score	0.168	0.102	0.437 *	0.060
	(0.139)	(0.239)	(0.257)	(0.252)
Average 8th-grade reading test percentile	0.001	-0.002	0.002 *	0.001
	(0.001)	(0.002)	(0.001)	(0.002)
Missing 8th-grade reading test score	-0.185	0.000	-0.385	-0.074
	(0.140)	(0.239)	(0.258)	(0.252)
Has sibling who dropped out	-0.021	0.007	-0.025	-0.505
	(0.031)	(0.053)	(0.053)	(0.372)
Is overage for grade level	-0.034	-0.049	-0.014	0.205
	(0.038)	(0.067)	(0.060)	(0.184)

(continued)

Table A.2 (continued)

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
Transferred school 2 or more times	-0.015	-0.016	-0.009	0.188
	(0.028)	(0.051)	(0.047)	(0.252)
Attendance rate	-0.002	-0.003	-0.001	-0.024 *
	(0.002)	(0.003)	(0.005)	(0.013)
Credits earned	0.000	0.000	-0.049	0.006
	(0.014)	(0.019)	(0.041)	(0.085)
Grade point average	0.006	0.046	0.028	-0.107
	(0.023)	(0.044)	(0.040)	(0.070)
Sample size	1,764	474	869	421
Degree of freedom	26	26	26	26
Mean of dependent variable	0.544	0.544	0.542	0.546
R-square	0.008	0.038	0.021	0.049
F-statistic	0.506	0.684	0.691	0.785
p-value of F-statistic	0.982	0.879	0.875	0.767

SOURCES: MDRC calculations from Career Academies Evaluation Student Baseline Questionnaire Database and Student School Records Database.

NOTE: The statistical significance of parameter estimates is indicated as *** = 1 percent; ** = 5 percent; * = 10 percent.

Table A.3

Career Academies Evaluation

Regression Coefficients for Probability of Being Assigned to the Academy Group, Student School Records Database, for Full Study Sample and by Risk Subgroups

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
Intercept	0.070	-0.599	0.800	1.392
	(0.440)	(0.837)	(0.813)	(1.790)
Sites				
Site 1	-0.019	-0.215	0.137	-0.139
	(0.081)	(0.168)	(0.118)	(0.168)
Site 2	0.037	-0.078	0.057	-0.101
	(0.090)	(0.181)	(0.128)	(0.219)
Site 3	0.118	0.175	-0.026	0.098
	(0.104)	(0.243)	(0.146)	(0.253)
Site 4	-0.035	-0.080	-0.077	0.015
	(0.100)	(0.189)	(0.145)	(0.292)
Site 5	-0.002	0.071	-0.040	0.011
	(0.066)	(0.119)	(0.099)	(0.150)
Site 6	0.010	0.075	0.119	-0.250 *
	(0.062)	(0.117)	(0.093)	(0.131)
Site 7	0.015	-0.063	0.031	0.090
	(0.053)	(0.102)	(0.078)	(0.109)
Site 8	0.020	-0.008	-0.006	0.086
	(0.051)	(0.115)	(0.076)	(0.102)
Expected graduation year				
1996	0.060	0.039	0.065	0.034
	(0.042)	(0.100)	(0.060)	(0.084)
1997	0.033	-0.046	0.028	0.046
	(0.036)	(0.093)	(0.051)	(0.068)

(continued)

Table A.3 (continued)

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
In 8th grade at application to Academy	-0.027	-0.135	-0.044	0.282
	(0.083)	(0.159)	(0.115)	(0.225)
Female	-0.013	0.028	-0.018	-0.016
	(0.028)	(0.061)	(0.040)	(0.055)
Age at application to academy	0.032	0.055	0.007	0.056
	(0.025)	(0.051)	(0.037)	(0.052)
Race/ethnicity				
Hispanic	0.003	0.220	-0.094	0.008
	(0.061)	(0.143)	(0.085)	(0.119)
African-American	0.050	0.290 *	-0.105	0.129
	(0.078)	(0.164)	(0.113)	(0.160)
Asian/Native American	0.048	0.174	0.003	0.121
	(0.079)	(0.180)	(0.112)	(0.153)
Average 8th-grade math test percentile	0.000	-0.001	-0.001	0.003
	(0.001)	(0.002)	(0.001)	(0.002)
Missing 8th-grade math test score	0.224	0.109	0.449 *	0.173
	(0.151)	(0.312)	(0.257)	(0.256)
Average 8th-grade reading test percentile	0.000	-0.001	0.001	0.000
	(0.001)	(0.002)	(0.001)	(0.002)
Missing 8th-grade reading test score	-0.248	-0.250	-0.399	-0.177
	(0.152)	(0.313)	(0.259)	(0.256)
Has sibling who dropped out	-0.008	0.027	-0.040	-0.463
	(0.034)	(0.065)	(0.056)	(0.496)
Is overage for grade level	-0.016	-0.020	-0.002	0.131
	(0.043)	(0.079)	(0.068)	(0.193)

(continued)

Table A.3 (continued)

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
Transferred school 2 or more times	-0.017	-0.077	0.015	0.076
	(0.032)	(0.062)	(0.052)	(0.289)
Attendance rate	0.000	0.001	-0.002	-0.019
	(0.002)	(0.004)	(0.005)	(0.014)
Credits earned	0.000	-0.004	-0.043	0.063
	(0.017)	(0.026)	(0.045)	(0.091)
Grade point average	-0.006	0.061	0.031	-0.135 *
	(0.027)	(0.057)	(0.042)	(0.074)
Sample size	1,454	345	724	385
Degree of freedom	26	26	26	26
Mean of dependent variable	0.538	0.536	0.543	0.530
R-square	0.008	0.047	0.029	0.060
F-statistic	0.432	0.601	0.797	0.881
p-value of F-statistic	0.995	0.940	0.754	0.636

SOURCES: MDRC calculations from Career Academies Evaluation Student Baseline Questionnaire Database and Student School Records Database.

NOTE: The statistical significance of parameter estimates is indicated as *** = 1 percent; ** = 5 percent; * = 10 percent.

Table A.4

Career Academies Evaluation

Regression Coefficients for Probability of Being Assigned to the Academy Group, 12th Grade Survey Database, for Full Study Sample and by Risk Subgroups

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
Intercept	-0.224	-1.142	0.585	1.964
	(0.430)	(0.799)	(0.802)	(1.768)
Sites				
Site 1	0.004	-0.168	0.144	-0.020
	(0.079)	(0.161)	(0.121)	(0.160)
Site 2	-0.033	-0.180	0.008	-0.059
	(0.088)	(0.168)	(0.127)	(0.230)
Site 3	0.075	-0.087	0.089	0.061
	(0.100)	(0.224)	(0.142)	(0.261)
Site 4	-0.057	-0.105	-0.127	-0.016
	(0.099)	(0.183)	(0.146)	(0.287)
Site 5	-0.010	-0.042	0.002	-0.026
	(0.066)	(0.118)	(0.100)	(0.150)
Site 6	-0.010	-0.015	0.092	-0.244 *
	(0.061)	(0.115)	(0.092)	(0.130)
Site 7	-0.005	-0.154	0.058	0.052
	(0.051)	(0.099)	(0.076)	(0.106)
Site 8	-0.003	-0.173	-0.006	0.067
	(0.050)	(0.109)	(0.073)	(0.101)
Expected graduation year				
1996	0.052	0.086	0.065	-0.006
	(0.041)	(0.096)	(0.059)	(0.083)
1997	0.042	-0.002	0.030	0.056
	(0.035)	(0.089)	(0.049)	(0.067)

(continued)

Table A.4 (continued)

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
In 8th grade at application to Academy	0.019	0.064	-0.037	0.141
	(0.082)	(0.153)	(0.115)	(0.240)
Female	-0.045	-0.007	-0.052	-0.032
	(0.027)	(0.059)	(0.039)	(0.055)
Age at application to Academy	0.053 **	0.102 **	0.010	0.062
	(0.025)	(0.048)	(0.036)	(0.052)
Race ethnicity				
Hispanic	0.049	0.241 *	-0.037	0.074
	(0.057)	(0.131)	(0.079)	(0.115)
African-American	0.108	0.275 *	-0.001	0.156
	(0.073)	(0.152)	(0.107)	(0.147)
Asian Native American	0.063	0.166	-0.004	0.191
	(0.075)	(0.167)	(0.107)	(0.148)
Average 8th-grade math test percentile	-0.001	-0.002	-0.001	0.002
	(0.001)	(0.002)	(0.001)	(0.002)
Missing 8th-grade math test score	0.120	0.294	0.408	-0.190
	(0.195)	(0.522)	(0.298)	(0.326)
Average 8th-grade reading test percentile	0.001	0.000	0.002 *	0.000
	(0.001)	(0.002)	(0.001)	(0.002)
Missing 8th-grade reading test score	-0.150	-0.446	-0.383	0.218
	(0.196)	(0.527)	(0.299)	(0.324)
Has sibling who dropped out	-0.015	0.003	-0.021	-0.600
	(0.034)	(0.060)	(0.057)	(0.373)
Is overage for grade level	-0.059	-0.072	-0.045	0.104
	(0.041)	(0.077)	(0.064)	(0.192)

(continued)

Table A.4 (continued)

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
Transferred school 2 or more times	0.005	0.007	-0.001	0.046
	(0.030)	(0.059)	(0.050)	(0.287)
Attendance rate	0.000	0.001	0.000	-0.024
	(0.002)	(0.003)	(0.005)	(0.014)
Credits earned	-0.009	-0.016	-0.051	0.027
	(0.016)	(0.024)	(0.044)	(0.089)
Grade point average	0.016	0.076	0.040	-0.101
	(0.026)	(0.054)	(0.043)	(0.072)
Sample size	1,510	366	755	389
Degree of freedom	26	26	26	26
Mean of dependent variable	0.548	0.552	0.539	0.560
R-square	0.099	0.053	0.025	0.057
F-statistic	0.571	0.729	0.712	0.839
p-value of F-statistic	0.959	0.832	0.854	0.696

SOURCES: MDRC calculations from Career Academies Evaluation Student Baseline Questionnaire Database, Student School Records Database, and 12th Grade Survey Database.

NOTE: The statistical significance of parameter estimates is indicated as *** = 1 percent; ** = 5 percent; * = 10 percent.

Table A.5

Career Academies Evaluation

Regression Coefficients for Probability of Being Assigned to the Academy Group, 12th Grade Achievement Test Sample, for Full Study Sample and by Risk Subgroups

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
Intercept	0.303	6.726	3.132 **	1.228
	(0.760)	(9.781)	(1.475)	(2.787)
Sites				
Site 1	0.168	-0.088	0.294	-0.081
	(0.138)	(0.335)	(0.196)	(0.343)
Site 2	0.162	-0.027	0.020	-0.013
	(0.145)	(0.367)	(0.199)	(0.388)
Site 3	0.123	0.184	0.052	-0.252
	(0.149)	(0.352)	(0.209)	(0.431)
Site 4	0.036	-0.120	-0.104	-0.032
	(0.153)	(0.389)	(0.215)	(0.432)
Site 5	--	--	--	--
Site 6	--	--	--	--
Site 7	0.097	0.108	0.240	0.231
	(0.110)	(0.247)	(0.170)	(0.228)
Site 8	0.035	-0.179	0.077	0.134
	(0.103)	(0.307)	(0.149)	(0.217)
Expected graduation year				
1996	--	--	--	--
1997	--	--	--	--

(continued)

Table A.5 (continued)

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
In 8th grade at application to Academy	0.030	0.156	-0.079	0.456
	(0.107)	(0.207)	(0.152)	(0.343)
Female	0.002	-0.039	0.012	0.125
	(0.049)	(0.114)	(0.073)	(0.098)
Age at application to Academy	0.023	0.159 *	-0.055	-0.051
	(0.045)	(0.092)	(0.072)	(0.091)
Race ethnicity				
Hispanic	-0.043	-8.717	-0.181	0.284
	(0.151)	(9.472)	(0.180)	(0.343)
African-American	-0.102	-8.610	-0.147	0.245
	(0.188)	(9.357)	(0.231)	(0.455)
Asian/Native American	-0.175	-9.347	-0.289	0.584
	(0.306)	(9.577)	(0.427)	(0.712)
Average 8th-grade math test percentile	-0.002	0.000	-0.004 *	0.001
	(0.001)	(0.004)	(0.002)	(0.003)
Missing 8th-grade math test score	0.209	0.528	0.344	0.098
	(0.238)	(0.570)	(0.380)	(0.439)
Average 8th-grade reading test percentile	0.003 *	0.001	0.003	0.003
	(0.001)	(0.004)	(0.002)	(0.003)
Missing 8th-grade reading test score	-0.185	-0.742	-0.280	0.204
	(0.243)	(0.601)	(0.376)	(0.453)
Has sibling who dropped out	0.014	-0.042	0.084	-0.801 *
	(0.061)	(0.118)	(0.100)	(0.427)
Is overage for grade level	0.026	0.005	0.039	2.770
	(0.079)	(0.154)	(0.123)	(2.509)

(continued)

Table A.5 (continued)

Variable	Full Study Sample Parameter Estimate (Standard Error)	High-Risk Subgroup Parameter Estimate (Standard Error)	Medium-Risk Subgroup Parameter Estimate (Standard Error)	Low-Risk Subgroup Parameter Estimate (Standard Error)
Transferred school 2 or more times	-0.050	-0.034	-0.048	-0.513
	(0.059)	(0.111)	(0.091)	(0.505)
Attendance rate	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000
Credits earned	-0.015	-0.039	-0.138 *	0.228
	(0.029)	(0.043)	(0.079)	(0.141)
Grade point average	-0.009	0.022	0.059	-0.186
	(0.049)	(0.140)	(0.077)	(0.126)
Sample size	490	110	233	147
Degree of freedom	22	22	22	22
Mean of dependent variable	0.545	0.573	0.532	0.544
R-square	0.027	0.144	0.095	0.123
F-statistic	0.568	0.667	0.997	0.792
p-value of F-statistic	0.926	0.860	0.470	0.731

SOURCES: MDRC calculations from Career Academies Evaluation Student Baseline Questionnaire Database, Student School Records Database, and 12th Grade Achievement Test Database.

NOTE: The statistical significance of parameter estimates is indicated as *** = 1 percent; ** = 5 percent; * = 10 percent.

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Appendix B

Strategies for Creating Subgroups of Students Defined by Characteristics Associated with Risk of Dropping Out

Much of the analysis presented in this report focuses on subgroups of students defined by background characteristics and prior school experiences associated with dropping out of high school. This appendix explains the manner in which these subgroups were created, including the rationale behind this strategy and the implications it has for interpreting the findings presented in this report.

I. Analytic Importance of Subgroup Analysis

A central theme that has emerged from the Career Academies Evaluation thus far is that in order to understand the impact of the programs, it is important to recognize the heterogeneity of the student population and the likelihood that some groups of students may benefit differently than others. As discussed in Chapter 3, when the impact results are averaged across the diverse groups of students the Career Academies served, it appears that the programs produced only slight reductions in dropout rates and modest improvements in students' progress toward graduation and increases in participation in youth development activities. These aggregate results mask the high degree of variation in the Career Academies' potential to make a difference and in the actual differences they made for some students. In short, findings that are aggregated across the diverse groups of students served by the Academies are unlikely to reveal many of the most important effects that Academies have. Positive effects for some subgroups of students may be offset or muted by small or zero impacts for other subgroups.

For example, an important goal of the Career Academies is to reduce dropout rates and increase students' engagement in school. As noted earlier in the evaluation, Career Academies serve a broad cross section of students, many of whom enter the programs highly engaged in school. It is unlikely that the programs will have an effect on dropout rates among these students, who are highly unlikely to drop out of school even if they do not attend an Academy. On the other hand, a number of students in the sample who applied for the Academies were relatively disengaged from high school and appeared to be at risk of dropping out of high school. To the extent that the Academies can have an effect on dropout rates, it is likely to be concentrated among these students. The magnitude of this effect could be diluted or even completely hidden if averaged with the lack of impact for the rest of the students in the sample.

In order to assess the effect of the Academies more sensitively, therefore, it was necessary to differentiate among students with different needs and trajectories at the time they entered the Academy. The attempt to make distinctions among groups of individuals with different needs and characteristics, who might experience substantially different benefits from an intervention, is not uncommon to experimental research in general or to education research in particular. An important goal of these subgroup strategies is often to make distinctions among groups of individuals who, in the absence of the treatment under study, would have experienced substantially different outcomes.

The random assignment research design used in this evaluation provides a unique opportunity to identify subgroups of students who, without access to an Academy, were relatively highly likely to drop out of high school and to compare them with similar students who did have access to an Academy. The use of the random assignment research design is relatively rare in the context of large-scale evaluations of education programs, particularly at the secondary school level. Not only does such a design provide the unusual opportunity to establish which outcomes

would have been observed in the absence of the Academy treatment, but it also provides an opportunity to observe the *relationships* between background characteristics and important outcomes in the absence of the intervention.

There are several strategies for identifying subgroups. The following section describes a more traditional approach and highlights several limitations that led to the use of a strategy that provides greater insight into the variation in program effects.

II. Traditional Approach to Defining Subgroups: Risk-Factor Accumulation

One of the strategies most frequently used to define subgroups might be called "risk-factor accumulation." It entails first identifying a list of background characteristics typically associated with an important outcome or with the manner in which the program treatment is likely to be delivered. A critical outcome for many high school interventions, including the Career Academy's approach, is dropping out of high school. A number of education research studies have identified several background characteristics and prior school experiences that are associated with a high likelihood of dropping out of high school. This includes prior school experiences such as poor attendance, low grades, or being held back in a previous grade. It also includes demographic characteristics such as being from a low-income family, having a sibling who dropped out, or having moved and transferred schools several times.

The risk-factor accumulation strategy classifies students into risk subgroups by counting the number of risk factors an individual has, weighting all the factors equally. For example, if one identified six characteristics associated with dropping out, individuals with two or more of these characteristics might be considered to be at "high risk" of dropping out; those with only one of the characteristics might be considered to be at "moderate" or "medium" risk of dropping out; and those with none of the characteristic factors might be considered at "low risk."

This strategy has the appeal of being straightforward in execution, and it can be translated directly into a strategy for targeting students to receive special services. For example, if a particular school intervention were found to prevent students in the high-risk subgroup from dropping out, teachers or administrators might wish to ensure that students with two or more of the risk characteristics be included in that program.

At the same time, the accumulation strategy has several important limitations. First, such an analysis gives equal weight to each of the risk-related background characteristics and prior school experiences examined. As a result, it does not account for the fact that some characteristics are more highly associated with school failure than others. This strategy also does not account for the fact that some characteristics are associated with school success and may offset the risk associated with other characteristics. As a result, it fails to account for the possibility that, *given the same number of risk factors, different combinations of characteristics may indicate different degrees of risk*. In other words, because some characteristics are more strongly associated with academic outcomes than others, students with the same number of characteristics may actually be substantially more or less likely than one another to drop out of high school. Finally, this strategy is based on categorical variables and is therefore unable to take advantage of the more subtle distinctions among students that are captured by continuous variables.

Because it does not allow for a more complex set of relationships between risk factors and student outcomes, the simple risk-factor accumulation strategy may fail to produce subgroups with distinctly different academic trajectories. Therefore, in order to distinguish more effectively among subgroups of students who, in the absence of the program, would have experienced distinctly different outcomes, the Career Academies Evaluation employed an imputation strategy for identifying subgroups. This is referred to throughout this report as a *regression-based subgroup strategy*.

III. Regression-Based Subgroup Strategy

A. Overview of the Approach

The basic idea behind the regression-based subgroup strategy is to build on the opportunity created by the random assignment experimental design in order to identify the relationships between background characteristics and student failure *in the absence of the Academy intervention*. Based on these relationships, one then identifies the characteristics of the students who, in the absence of the program, are most likely to drop out of high school.

The regression-based strategy involves three steps. The first step is to use multiple regression to estimate the relationship between several background characteristics measured at the time students applied to the Academy and the probability that they would drop out of high school before the end of the 12th grade. The background characteristics included in the Career Academies Evaluation are:

- average daily attendance in the year the student applied for an Academy;
- grade point average for the year the student applied for an Academy;
- the number of credits earned toward graduation in the year the student applied for an Academy;
- whether the student was overage for grade when entering the Academy;
- whether the student had a sibling who dropped out of high school; and
- whether the student had transferred schools two or more times beyond the typical school transitions.

The goal of this analysis is to capitalize on the experimental design and estimate the relationships between background characteristics and dropping out of high school in the absence of access to an Academy. The random assignment research design ensures that the non-Academy group provides the best counterfactual for what would have occurred to students in the absence of access to an Academy. Thus, the non-Academy group was used as the basis for this regression. Table B.1 presents the results of this regression analysis. The first column of parameter estimates reflects the relationship between the dropout rate and a unit change in the background characteristics. Numbers in the second column are standardized to reflect the relationship between the dropout rate and a *standard deviation* change in the background characteristics. As the table suggests, all the characteristics included in this regression model are statistically significant and are

Table B.1

Career Academies Evaluation

Relationship Between Baseline Characteristics and the Probability of Dropping Out of High School Among Non-Academy Students

Baseline Characteristic	Coefficients	
	Unstandardized	Standardized
Sibling dropped out	0.08 ***	0.03 ***
	(0.03)	(0.01)
Overage for grade	0.06 **	0.02 **
	(0.03)	(0.01)
Transferred schools 2 or more times	0.07 ***	0.03 ***
	(0.03)	(0.01)
Attendance rate in year of random assignment	-0.01 ***	-0.04 ***
	(0.00)	(0.01)
Credits earned in year of random assignment	-0.05 ***	-0.05 ***
	(0.01)	(0.01)
Grade point average in year of random assignment	-0.03 *	-0.02 *
	(0.02)	(0.01)
Intercept	0.94 ***	0.12 ***
	(0.14)	-(0.14)
R-squared	0.10	0.10
Sample size	763	763

SOURCES: MDRC calculations from Student Baseline Questionnaire Database and Student School Records Database.

NOTES: Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. In both cases, statistical significance levels are indicated as *** = 1 percent; ** = 5 percent; * = 10 percent.

related to the probability that students would drop out of high school before the end of the 12th grade.[1]

The second step in this analysis is to combine the coefficients from the regression estimates for the non-Academy sample with the background characteristics of each individual in

[1]Other specifications of this model were tried. However, through an informal process of model specification, this six-variable model was found to be the most sensible and effective. The estimates (below) of the potential distortion caused by the regression-based approach do not take into account any effects of the model specification process on the impact estimates.

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both the Academy and the non-Academy groups. In other words, the coefficient estimates from the regression are used as weights multiplied by the relevant measured background characteristics of each individual. The weighted sum of these characteristics yields an index indicating the probability of dropping out of high school. This is referred to as the *risk index*, and it provides a basis for ranking sample members according to the predicted probability that they would drop out of high school.

For example, the parameter estimate associated with having a sibling who dropped out of school is .08 (that is, controlling for other background characteristics, students in the evaluation who had a sibling who already dropped out of high school were predicted to be 8 percentage points more likely to drop out of high school). Therefore, students with siblings who dropped out had .08 added to the index measuring their own risk of dropping out. By the same token, the regression estimates indicate that some characteristics are negatively correlated with dropping out. The weights assigned to these characteristics were multiplied by individual attributes and subtracted from the risk index.

In the third step of this regression analysis, the Academy and non-Academy students are divided into three subgroups based on the risk index. Following is a brief definition of each of the three risk subgroups.

- **The high-risk subgroup:** the students in the Academy and non-Academy groups with the combination of characteristics yielding scores at or above the 75th percentile of scores on the risk index (that is, those with the highest likelihood of dropping out)

- **The low-risk subgroup:** the students in the Academy and non-Academy groups with the combination of characteristics yielding scores at or below the 25th percentile of scores on the risk index (that is, those with the lowest likelihood of dropping out)

- **The medium-risk subgroup:** the remaining students in the Academy and non-Academy groups (approximately 50 percent of the study sample) with a mix of characteristics yielding scores between the 25th and 75th percentile on the risk index (that is, indicating they were not particularly likely to drop out but not necessarily highly engaged in school)[2]

B. Strengths of the Regression-Based Strategy

There are several important advantages to the regression-based strategy for defining subgroups. First, it incorporates factors which are both conceptually and empirically related to students' risk of dropping out of high school. At the same time, because these characteristics were measured prior to students' random assignment to the Academy and non-Academy groups, they are *exogenous* to the Academy treatment. In other words, while the background characteristics used to create the subgroups were correlated with the likelihood of dropping out, these characteristics did not influence the selection of students into the Academy group.

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[2]The 25th and 75th percentile cutoffs were based on the distribution of the risk index among the non-Academy students.

An important question for such an impact analysis is whether, within each subgroup, the random assignment research design is preserved. In other words, are there systematic differences between the background characteristics of the Academy and non-Academy students *within* each subgroup? To test this, a set of background characteristics is regressed against a dummy variable indicating whether the student was assigned to the Academy group. Appendix A presents the results of this analysis, which revealed that while there are a few differences between the background characteristics of Academy and non-Academy students within each subgroup, f-tests failed to reject the hypothesis that there are no overall systematic differences between the background characteristics of the Academy and non-Academy students. This suggests that the random assignment research design was preserved within each subgroup. In other words, the existing differences are not greater than those which would be expected to occur by chance.

A second strength of this approach is that it incorporates the fact that the relationships between "risk factors" and student outcomes vary, depending on the background characteristic. For example, the coefficient estimates suggest that the effect of the number of credits earned in the year prior to random assignment and the effect of baseline attendance on the dropout rate are each at least twice as large as the effect of a student's baseline grade point average or whether a student was overage for grade.[3] Basing the subgroup definitions on these relationships allows these differences to be factored into the classification of students into the three risk subgroups. For example, these regression estimates suggest that an average student who had a sibling who had dropped out and who was overage for grade would have approximately a 24 percent chance of dropping out of high school before the end of the 12th grade. However, if that same student also had 98 percent attendance and was about a standard deviation above the average in terms of credits earned, he or she would have only a 16 percent chance of dropping out.[4]

Moreover, the regression-based strategy is capable of incorporating variation across students along continuous variables such as attendance and grade point average. Less flexible strategies that fail to incorporate these factors would not be as effective at distinguishing among students at different levels of academic risk. For example, an otherwise average student with perfect attendance (that is, 100 percent) has a 9 percent chance of dropping out; a similar student with an attendance rate of 95 percent has a 12 percent chance of dropping out; a student with a 90 percent attendance rate has a 15 percent chance of dropping out; and one with 85 percent attendance has a 17 percent chance of dropping out. In other words, there appears to be meaningful variation in the probability of dropping out that would not be captured by a simple categorical measure of attendance. The regression-based subgroup strategy captures such variation and incorporates it into the assessment of each student's risk of school failure.

The third and perhaps most important strength of the regression-based strategy is that it effectively identifies students with distinct academic trajectories. Figure B.1 presents the dropout rates for Academy and non-Academy students, as well as the difference between their dropout

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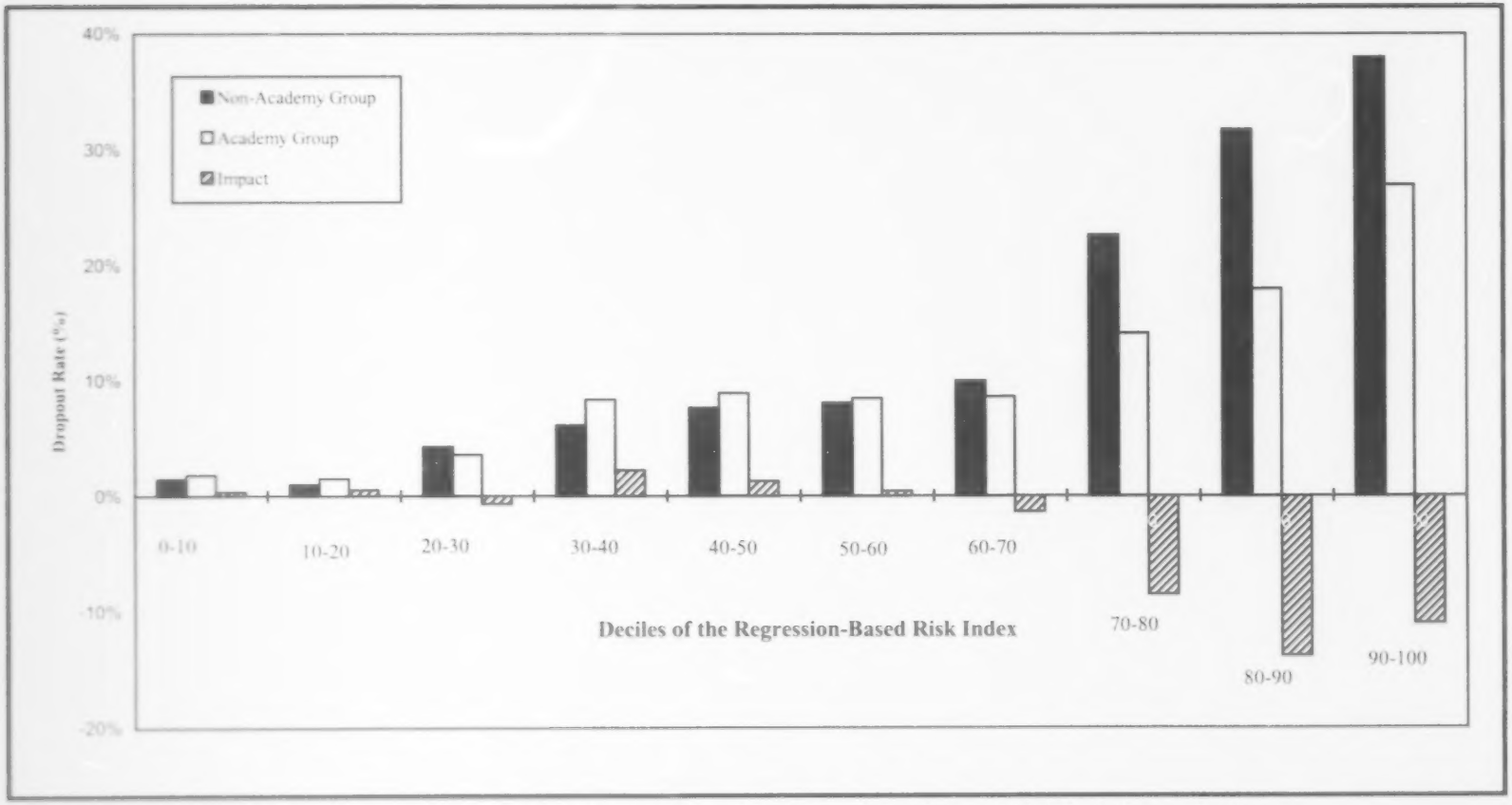
[3]Note that these coefficients have been standardized to reflect the effect of a standard deviation change in the independent variable on the dropout rate, thus making the coefficient estimates directly comparable with one another.

[4]The predicted probability of dropping out for the average student was estimated by multiplying the mean values of the independent variables among the students in the study sample by the coefficients in Table B.1. The estimated probabilities for students with the hypothesized characteristics were estimated by substituting the hypothesized values for the mean values where appropriate.

Figure B.1

Impact of Career Academies on Dropout Rate, by Deciles of the Regression-Based Risk Index



SOURCES: MDRC calculations from Career Academies Evaluation Student School Records Database and 12th Grade Survey Database.

rates, at 10 percentile intervals on the regression-based risk index. The black bars represent the percentage of non-Academy students who dropped out of high school, and the white bars represent the percentage of Academy students who did so. The striped bars represent the difference between these two groups, that is, the impact of the Academy treatment on dropout rates. The pattern in this figure suggests that the risk index very effectively differentiates among students with different academic trajectories, and that the relationship between risk and the impact of Academies on dropout rates is not isolated to a small segment of the student population.

The figure indicates that both the risk of dropping out and the impact of the program on this outcome generally increase with the percentiles of the risk index. In particular, the dropout rate among the non-Academy group appears to increase steadily with the percentiles of the risk index, and it grows sharply after the 70th percentile. The impact on the dropout rate follows essentially the same pattern. From the 30th percentile through the 90th, the difference between the Academy and non-Academy groups becomes increasingly negative. The magnitude of this reduction in dropout rates appears to increase dramatically after the 70th percentile, and then it shrinks slightly among students above the 90th percentile of risk. This pattern suggests that, for the individuals with low to moderate risk of dropping out, the impact of the program on dropout rates appears to be rather negligible. However, as the risk of academic failure becomes more serious, the impact of the Academy approach appears to grow. Finally, for those at greatest risk, the impact on dropout rates is substantial, but it is not as great as for those who are slightly less at risk.

In short, this graph illustrates that the regression-based strategy is quite effective at differentiating among students with different degrees of Academic risk, and that the impact of the Academies on the dropout rate is strongly related to this definition of academic risk.

Table B.2 illustrates that the regression-based strategy is effective at differentiating among students with different trajectories across a variety of school outcomes, and that it is more effective than the risk-factor accumulation strategy for making these distinctions. The table presents several key measures of student performance during high school for the non-Academy students within each risk subgroup. The first panel of the table presents non-Academy outcome levels and estimated impacts based on the risk-factor accumulation approach, and the second panel presents these estimates based on the regression-based approach to defining subgroups. As the table illustrates, the regression-based strategy does a better job of making distinctions among students with different levels of academic risk.

According to the estimates generated by the regression-based approach, while 32 percent of the non-Academy students in the high-risk subgroup dropped out of high school before the end of the 12th grade, 8 percent in the medium-risk subgroup dropped out, and less than 3 percent in the low-risk subgroup did so. Moreover, while only 27 percent of the non-Academy students in the high-risk subgroup earned enough credits to graduate from high school, 65 percent in the medium-risk subgroup and 75 percent in the low-risk subgroup did so. Similar patterns were found for most other measures as well. This indicates that, without access to a Career Academy, the students in the different risk subgroups would have had substantially different outcomes.

Table B.2 also provides outcome levels and estimated impacts for subgroups based on the risk-factor accumulation approach. Not surprisingly, these estimates are not as distinct from one another as the estimates generated by the regression-based approach. For example, 22 percent of

Table B.2

Career Academies Evaluation

Selected Outcomes Among Non-Academy Students, by Risk Subgroups Defined Using Risk-Factor Accumulation and Regression-Based Index

	Accumulation Approach		Regression-Based Approach	
Outcome	Non-Academy Outcomes (%)	Impact	Non-Academy Outcomes (%)	Impact
High-risk subgroup				
Dropped out of high school	27.4	-5.6 *	32.3	-11.4 ***
Earned credits to graduate	34.1	10.0 **	27.0	12.8 ***
Completed basic academic core	9.9	9.1 *	5.6	8.0 *
Reported any negative risk-taking	36.9	-5.9	38.9	-3.8
Reported positive youth development	56.8	8.7 *	54.9	8.0
Medium-risk subgroup				
Dropped out of high school	9.3	-2.0	7.9	0.9
Earned credits to graduate	66.2	-0.6	64.8	0.8
Completed basic academic core	31.0	-2.7	30.3	-1.2
Reported any negative risk-taking	23.1	0.5	25.7	-2.2
Reported positive youth development	67.5	4.1	69.7	1.6
Low-risk subgroup				
Dropped out of high school	4.2	0.5	2.8	-1.2
Earned credits to graduate	69.5	8.4 **	74.8	12.9 **
Completed basic academic core	33.9	0.9	36.6	4.5
Reported any negative risk-taking	22.0	-2.1	15.8	-1.0
Reported positive youth development	75.4	0.8	75.5	6.3

SOURCES: MDRC calculations from Career Academies Evaluation Student School Records Database and 12th Grade Survey Database.

NOTES: Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences.

A two-tailed t-test was applied to differences between the Academy and non-Academy groups. In both cases, statistical significance levels are indicated as *** = 1 percent; ** = 5 percent; * = 10 percent.

students in the "high-risk" subgroup dropped out of high school before the end of the 12th grade, compared with 7 percent in the "medium-risk" subgroup and 5 percent in the "low-risk" subgroup. Moreover, 44 percent in the "high-risk" subgroup earned enough credits to graduate, compared with 66 and 78 percent in the "medium-risk" and "low-risk" subgroups, respectively.

These patterns in outcome levels among students who weren't exposed to the Academy treatment suggest that the regression-based strategy is the more effective means for defining subgroups of Career Academy students with substantially different academic trajectories. Interestingly, the impact estimates suggest that while the estimates generated by the regression-based approach tend to be somewhat larger, their pattern is similar to the pattern of estimates based on the risk-factor accumulation model. For example, among students in the high-risk subgroup, both the regression-based approach and the risk-factor accumulation approach found that Academies significantly reduced dropout rates, increased credits earned toward graduation, and increased the percentage of students who completed a core academic curriculum. So while the regression-based approach was more effective at identifying students who, in the absence of the Academy treatment, would have had substantially different outcomes, it did not distort the basic pattern of impacts generated by the experiment.

C. Potential Limitations of the Regression-Based Approach

While the regression-based strategy is more effective than the risk-factor accumulation strategy at identifying students who were likely to experience different academic trajectories in the absence of the Academy, it has some potentially important limitations. First, although it is more systematic, it is also less straightforward than the risk-accumulation strategy in terms of the manner by which subgroups of students might be identified by school administrators. In particular, to the extent that these subgroup findings might be used to target program resources toward particular individuals, the subgroups defined using the regression-based strategy might be more difficult to identify than subgroups based on a simple accumulation approach. While it is unclear that the implications of the findings from this particular study suggest that targeting would be advantageous, such thinking may be a factor when applying this strategy to the study of programs in which the implications of targeting are less ambiguous. Although it is not discussed in this appendix, the regression-based approach can be applied in a practical way and may, in fact, be a more systematic way of targeting resources toward students most likely to benefit from them. For example, this type of approach has been used in research designed to develop approaches for the targeting of benefits and associated employment services to workers eligible for unemployment insurance as well as for targeting employment resources to individuals in welfare-to-work programs. In particular, several of these programs have used historical data to estimate the relationship between background characteristics and policy-relevant outcomes, and then to combine these estimates with individual characteristics in order to predict outcomes and target services. This has been done in welfare-to-work programs in Michigan as well as in unemployment programs in Michigan, New Jersey, and Washington (O'Leary, Decker, and Wadner, 1998; Eberts, 1997).

A more important potential limitation of the regression-based subgroup strategy is related to the manner in which the strategy generates weights relating background characteristics to risk. In short, theoretically, the strategy has the potential to overstate any positive impacts of the program on the high-risk subgroup and to overstate the magnitude of any negative impacts on the low- and medium-risk subgroups.

The problem has its genesis in the fact that the regression parameter estimates that are used as weights to translate student characteristics into academic risk are the result of estimates that are specific to the non-Academy group. In a sample from any population, estimated regression coefficients reflect both the relationships that exist in the population and a random element that is specific to that sample. In other words, on average, each coefficient from such a random sample is unbiased. However, it is highly unlikely that, in any given sample, the estimated regression coefficient will exactly equal the true regression coefficient from the entire population from which that sample is drawn. Therefore, the regression estimates from the non-Academy group include some random error that is particular to the non-Academy group and that is correlated with the outcome in question — in this case, whether or not a student dropped out before the end of the 12th grade.

For example, Equation 1 is a simple regression predicting dropout from a set of background characteristics for a sample of students drawn from the population of students who applied to a Career Academy:

$$Y_i = \hat{\alpha} + \hat{\beta} X_i + e_i \qquad (1)$$

where:

Y_i = 1 if student *i* dropped out; 0 otherwise;

X_i = 1 if student i had ever been held back; 0 otherwise (this could be any important background characteristic);

$\hat{\alpha}$ = the intercept term, that is, the average outcome (Y_i) among those where $X = 0$; and

$\hat{\beta}$ = the estimated relationship between X_i and Y_i, that is, the estimated effect of X_i on the probability that a student drops out of high school.

In this case, it would also be true that:

$$\hat{\beta} = \beta + \beta_e \qquad (2)$$

where:

β = the true relationship between X and Y in the population from which our sample was drawn; and

β_e = the difference (or error) between the relationship between X and Y in the population from which the sample was drawn and the relationship between X

and Y in the sample, that is, the element of the estimate which is idiosyncratic to the particular sample.

While β is a characteristic of the population and does not change from sample to sample, β_s is particular to the sample upon which the regression is estimated, and it *will* vary from sample to sample. As a result, while β never changes, $\hat{\beta}$ will vary from sample to sample. Furthermore, it is also highly unlikely that the random error in a coefficient estimated from one sample drawn from a population will be exactly the same as the random element in any other sample drawn from the same population.

The students in the Career Academies evaluation sample were assigned to the Academy or non-Academy groups at random; therefore, one can have a high degree of confidence that there are no *systematic* differences between these two groups in terms of observable or unobservable characteristics. They can be thought of as two random samples drawn from the same population of students at these sites who applied to and were eligible for the Career Academies. While the program may have changed the relationships between background characteristics and the probability of dropping out, the underlying relationship between background characteristics and the likelihood of dropping out in the absence of the Academy intervention (β) is the same for these two groups.

However, *even in the absence of the Academy program*, it is unlikely that the estimated coefficients relating the background characteristics to the dropout rate among the students who ended up in the program group would have been exactly the same as those in the non-Academy group. In other words, while the underlying relationship between background characteristics and the probability of dropping out (β) would not vary across these two samples, the idiosyncratic element (or error term) of the *estimated* relationship (β_s), and therefore the estimated relationship itself ($\hat{\beta}$), *would* vary.

Therefore, it is highly unlikely that the estimated relationship between background characteristics and dropout would have been *exactly* the same among the Academy group as it was among their non-Academy group counterparts. Because the regression weights were generated from the non-Academy group, the regression-based strategy might more accurately distinguish among students with different levels of academic risk for this group than it does for the Academy group. In other words, the risk index might distinguish different levels of risk more effectively among non-Academy students that it does among Academy group students.

This creates the possibility that, although their *observable* characteristics were the same, students in the "high-risk" non-Academy group were actually more at risk than students in the "high-risk" Academy group. It also creates the possibility that students in the "low-risk" non-Academy group were actually less at risk than students in the "low-risk" Aademy group.

To the extent that this occurred, it would result in overstating positive impacts for the high-risk subgroups and overstating the magnitude of negative impacts for the "low-risk" subgroups. However, as the next section will reveal, the magnitude of this potential distortion can be estimated. Furthermore, the magnitude of the distortion appears to be minimal, and it is not large enough to have a meaningful effect on the overall pattern of impact estimates.

IV. Magnitude of Potential Distortion in the Regressions-Based Approach

In order to understand whether this potential limitation outweighs the analytic advantages of the regression-based approach discussed earlier, it is important to estimate the magnitude of the potential distortion.

Theoretically, in order to estimate the magnitude of this distortion, one would like to compare the outcomes of the students within each risk category in the non-Academy group with what would have been observed among the Academy students in the same risk subgroup *in the absence of the treatment*. However, because the Academy group received the treatment and the treatment may have actually affected these outcomes, this comparison cannot be made. The ideal basis for such a comparison would be a second non-Academy group that was neither used in order to estimate the dropout regression nor exposed to the program. In the absence of any distortion, one would expect that, within each risk subgroup, the outcomes for the students in this sample would be identical to the outcomes for these in the original non-Academy group. Therefore, any differences between outcomes for these students and outcomes for the original non-Academy group could be confidently attributed to the distortion created by the regression-based strategy.

Although a second non-Academy group for this study is not available, a strategy for estimating the potential distortion in the original estimates is to use bootstrap sampling in order to simulate a second sample. Bootstrap sampling is commonly used to generate estimates of standard errors and other population characteristics from relatively small samples (Stine, 1990). It rests on the assumption that the sample from which the observations are drawn is representative of the population as a whole. In this case, to the extent that the initial non-Academy group can be thought of as representative of the population of students from whom the evaluation sample was drawn, bootstrap sampling procedures can be used to simulate new samples of non-Academy group students. Within each subgroup, these samples can be used in order to compare the outcomes for the students on whom the dropout regression was based with the outcomes for a sample of students who were not included in this regression. These differences would constitute a reliable estimate of the distortion created by the regression-based subgroup strategy.

The mechanics of this process are as follows:

1. Use a random number generator to draw a bootstrap sample of students the size of the original non-Academy group, sampling *with replacement* the observations from the original non-Academy group sample.

   a. Use a random number generator to select an observation from the original non-Academy group.

   b. Copy that observation to a new data set.

   c. Replace that observation into the sampling frame from which it was drawn (the original non-Academy group sample).

   d. Repeat steps a through c until the new sample equals the size of the original non-Academy group (n=805 times). This sample will be referred to as the *model group*.

This creates a sample which is the same size as the original non-Academy sample and which, theoretically, is drawn from the same population.[5] However, this sample is not the same as the non-Academy group, because steps a through d typically create a sample which omits several observations from the original sample and creates multiple copies of other observations.

2. Use this bootstrap sample to estimate the relationship between the six background characteristics used to define academic risk and the probability that a student will drop out of high school prior to the end of the 12th grade.

3. Repeat steps 1a through 1d to draw (with replacement) a second bootstrap sample, the size of the Academy group, from the original non-Academy sample. This sample will be referred to as the *non-model group*.

4. Repeat steps 1a through 1d once more, this time drawing from the *Academy* sample, to produce a bootstrap sample of students from each risk subgroup who received the Academy treatment. This sample will be referred to as the *simulated Academy group*.

5. Apply the coefficients from the regression model to the background characteristics of the individuals in all three bootstrap samples in order to create the risk index.

6. Use the 25th and 75th percentiles of the risk index in the first bootstrap sample (the model group) in order to divide the samples into high-, medium-, and low-risk subgroups.

7. Compare the average outcomes from the model group with those from the second bootstrap sample (the non-model group). The difference between the two groups represents the distortion created by the regression-based strategy.

8. Repeat steps 1 through 7 another 200 times. The average difference across these iterations between the subgroup outcomes for the model group and the non-model group provides a bootstrap estimate of the potential distortion created by the regression-based subgroup strategy. The average levels across these iterations among the simulated Academy group represents a bootstrap estimate of the outcome levels among the Academy students.

Table B.3 presents the results of this estimation process for five key outcomes. The numbers in this table represent the average outcomes of 200 iterations of the bootstrap process describe above. As such, they are intended to simulate what one would expect to observe if one repeated the experimental analysis contained in the report 200 times, with 200 different samples from the same population. The first column of the table presents the average outcomes among students from the bootstrap samples upon which the dropout regression was estimated (the model group). The numbers in this column represent the outcome levels one would expect to observe as

[5]In particular, this replaces the unknown theoretical distribution of the population from which the non-Academy group is drawn with the empirical distribution of the non-Academy sample itself.

Table B.3

Career Academies Evaluation

Outcome Levels for Bootstrap Control Samples and Program Group, by Risk Subgroups

Outcome	Model Group (%)	Non-Model Group (%)	Model Minus Non-Model	Program Group (%)	Program Minus Model	Program Minus Non-Model
High-risk subgroup						
Dropped out of high school	31	30.3	0.7 **	20.7	-10.3	-9.6
Earned credits to graduate	28.5	28.6	-0.1	40.2	11.7	11.6
Completed basic academic core	7.3	7.2	0.1	15.3	8	8.1
Reported any negative risk-taking	39.5	39	0.5	32.9	-6.6	-6.1
Reported positive youth development	55.4	56.1	-0.7 *	64.5	9.1	8.4
Medium-risk subgroup						
Dropped out of high school	8.4	8.9	-0.5 ***	9	0.6	0.1
Earned credits to graduate	63.4	63.4	0	65.6	2.2	2.2
Completed basic academic core	28.9	29	-0.1	28.2	-0.7	-0.8
Reported any negative risk-taking	25.3	25.1	0.2	24.2	-1.1	-0.9
Reported positive youth development	68.6	68.8	-0.2	70.6	2	1.8
Low-risk subgroup						
Dropped out of high school	2.8	2.9	-0.1	2.2	-0.6	-0.7
Earned credits to graduate	75.8	76.1	-0.3	84.9	9.1	8.8
Completed basic academic core	36.7	36.6	0.1	39	2.3	2.4
Reported any negative risk-taking	16.8	16.7	0.1	15.7	-1.1	-1
Reported positive youth development	77.2	76.8	0.4	80.3	3.1	3.5

SOURCES: MDRC calculations from Career Academies Evaluation Student School Records Database and 12th Grade Survey Database.

NOTES: Estimates are regression-adjusted using ordinary least squares, controlling for background characteristics of sample members. Rounding may cause slight discrepancies in calculating differences.

A two-tailed t-test was applied to differences between the model and non-model groups. In both cases, statistical significance levels are indicated as *** = 1 percent; ** = 5 percent; * = 10 percent.

a result of the regression-based approach among the sample of non-Academy students on whom the regression was fit.

Column 2 of Table B.3 presents the average outcomes among students from the bootstrap samples which were not used for this regression (the non-model group). The numbers in this column represent the pattern of outcomes one would expect to observe if one had a sample of non-

Academy students who were not the basis for the regression model but for whom the coefficients from the regression-based strategy were combined with individual characteristics in order to estimate the risk of school failure.

The third column of Table B.3 presents the differences between the two averages for the model and non-model groups. Because the second column of estimates is not affected by the potential distortion described above, these numbers represent the estimate of the potential distortion created by the regression-based strategy for each outcome.

The fourth column of Table B.3 presents the average outcomes for the high-, medium-, and low-risk subgroups from the simulated Academy (program) group. The fifth column presents the average differences between the simulated Academy group and the model group from column 1. This represents a bootstrap estimate of the program impact. The sixth column presents the average differences between the simulated Academy group and the non-model group from column 2. This represents a bootstrap estimate of the program impact, *absent any distortion created by the regression-based subgroup strategy*.

The estimates in Table B.3 suggest that the magnitude of the distortion created by the regression-based subgroup strategy is not large enough to have a meaningful effect on the pattern of impacts described in the report. In particular, for each of the outcomes in this table, the estimated distortion appears to be less than 1 percentage point. For example, the first row of the table presents the bootstrap estimates of the dropout rate for the high-risk subgroup. Inasmuch as whether or not a student dropped out of high school was the dependent variable in the regression used to define the subgroups, the potential magnitude of the distortion should be largest with respect to that outcome. However, the estimate in this row suggests that the potential distortion in the impact estimate is seven-tenths of 1 percentage point. In particular, across 200 replications, the average dropout rate for the high-risk sample from the model group is 31 percent, while the average for the sample that was *not* used to estimate the regression (from the non-model group) is 30.3 percent, a difference of .7 percentage points.[6]

Columns 4 and 5 of Table B.3 indicate that subtracting the potential distortion does not result in a meaningfully different estimate of the program impact. In particular, the estimate of the impact and the estimate of the impact minus any potential distortion appear to be within rounding error of one another. Moreover, the other estimates in this table reveal a similar pattern. The estimated distortion is never larger than seven-tenths of a percentage point, and the pattern of effects in the impact estimates is not substantially different from the pattern of effects in the column estimates that account for the distortion. This suggests that, while the regression-based subgroup strategy has theoretical limitations, the limitations do not have any meaningful effect on the pattern of impacts presented in this report.

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[6]An alternate estimate of the distortion was generated by performing what might be called a randomization test. This entailed taking the entire evaluation sample, including Academy and non-Academy students, and randomly assigning them to two groups. The dropout regression was then estimated within one group, and the coefficients were used to generate an index and divide the sample into risk categories in both groups. The difference between the outcomes for these groups would represent an alternative estimate of the distortion. After performing this process 200 times, it was found that this alternative method yielded a pattern of estimated distortion similar to that produced by the initial method. In particular, the estimated distortion on the dropout variable was 1.3 percentage points, and the estimated distortion on all other variables was smaller than that.

The asterisks in the table indicate the results of statistical significance tests regarding the differences between the model and non-model groups. They suggest that, across the five outcomes and three subgroups considered, the estimated distortion created by the regression-based subgroup strategy was statistically significant in only three cases. In particular, for the high-risk subgroup, the estimated distortion created with respect to the dropout variable and the percentage of students who participated in positive youth development activities was significantly different from zero. For the medium-risk subgroup, the distortion created regarding the dropout rate was also statistically significant. The estimated distortion across all other outcomes was not significantly different from zero.

This pattern, combined with the magnitude of the effects, suggests two conclusions. First, the estimated distortion created by the regression-based subgroup strategy appears to converge around some non-zero number, but that effect does not appear to be large enough to affect the basic pattern of impacts. Second, the distortion appears to be restricted mainly to the outcome variable that was the basis for defining the subgroups, and it was concentrated within the high-risk subgroup.

V. Conclusions

The evidence and discussion in this appendix strongly support the idea that accounting for the heterogeneity of students in the Career Academies Evaluation is an important element of any strategy designed to assess the impact of the Academies on the diverse group of students they serve. Impact estimates which aggregate results across students with different academic trajectories conceal a substantial amount of variation across students in the effects of the Academies on key outcomes. Therefore, in order to assess the effects of Career Academies more sensitively, it is necessary to develop a strategy for differentiating among students who, in the absence of the Academy treatment, would experience different academic outcomes.

Traditional approaches toward defining subgroups go part of the way toward differentiating among students with different academic trajectories. However, the experimental design present in the Career Academies Evaluation provides a rare opportunity to improve on these strategies by estimating the relationship between student characteristics and the likelihood of school failure *in the absence of the Academy treatment*.

This regression-based approach offers a number of distinct advantages over its alternatives, and its potential limitations are highly unlikely to change the pattern of any of the findings. The regression-based approach takes multiple factors into account, weighting them according to the strength of their effect on student failure. It also allows the use of all relevant variation in student characteristics in order to estimate risk, as opposed to classifying students on the basis of arbitrary cutoffs in otherwise continuous measures of risk. Most important, it is a highly effective strategy for identifying students who, *in the absence of the Academy intervention*, would have had substantially different outcomes. As a result, it reveals differences in the effects of Career Academies that would be masked by impacts which are averaged across the entire population of Academy students — and would be at least partly masked by traditional approaches to defining subgroups.

The major drawback of the regression-based strategy is that it has the potential to generate a distortion in the impact estimates that would overstate the impact of the Academies on students in the high-risk subgroup. However, the best estimates of the potential distortion in impact estimates suggest that its magnitude is negligible. In particular, the estimates suggest that the distortion, at it largest, is seven-tenths of a percentage point. Moreover, any distortion which exists appears to be concentrated within the high-risk subgroup and to be restricted primarily to one outcome. In other words, both the magnitude and pattern of distortion suggest that this phenomenon is neither large nor pervasive enough to affect the overall pattern of impacts presented in the report.

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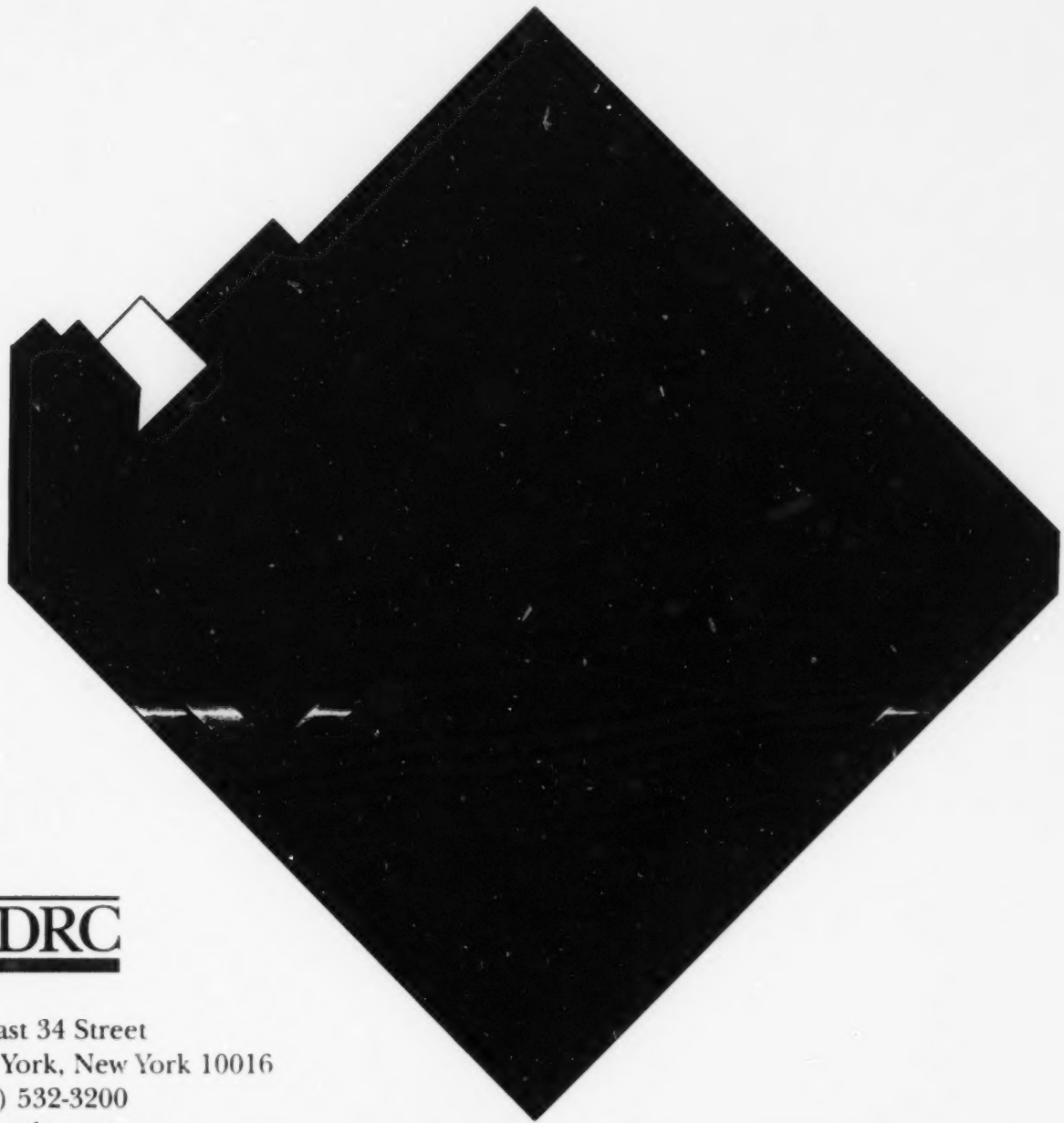

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